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Industrial Arts and VOCATIONAL EDUCATION

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The Shop Teachers' Professional Magazine

MAY REQUISITION NUMBER

The Unending Search for the World's Wealth

WITH drills that thrust probing fingers thousands of feet into the earth's crust, with seismographic shock recorders that catch the second chord of an explosion angle, with sensitive and delicate radiographic instruments, men seek to pierce the camouflage behind which earth has hidden its black and yellow gold.

In thousands of classrooms the country over, men probe for another and greater wealth, the riches hidden in the hearts and minds of the boys in their care, from which must come the leadership that tomorrow will take over the management of this country. Riches are there, but far too often wasted. It is this waste of human ability that constitutes a challenge to every right thinking educator. It is a challenge to go beyond the routine of mere teaching, to imbue his lads with the spirit of achievement, to awaken in them the "divine discontent" with things as they are, to give them a vision of the greater possibilities that lie within their reach and their powers, and to help them find the pathway that leads to the goal.

In this unending search for the world's wealth, the drawing instruments a boy uses in mechanical drafting can be of great help. Usually the first precision tools of creative endeavor he has ever used, if they are of fine quality they can make a deep and lasting impression on him. They can have the same effect a great champion's bat has on a younger lad, giving him new stature in his own eyes. He visibly "grows up" as he realizes these are the instruments used by the immortals of the scientific and engineering world. They bring the reality of today and the dream of tomorrow closer together, form a bridge between the two. They can be the first sure steps of a *career* whether in engineering or a field totally different. The drawing instruments a boy uses are important. Let them be fine, of highest quality, impressive. The boy's future is worth it.

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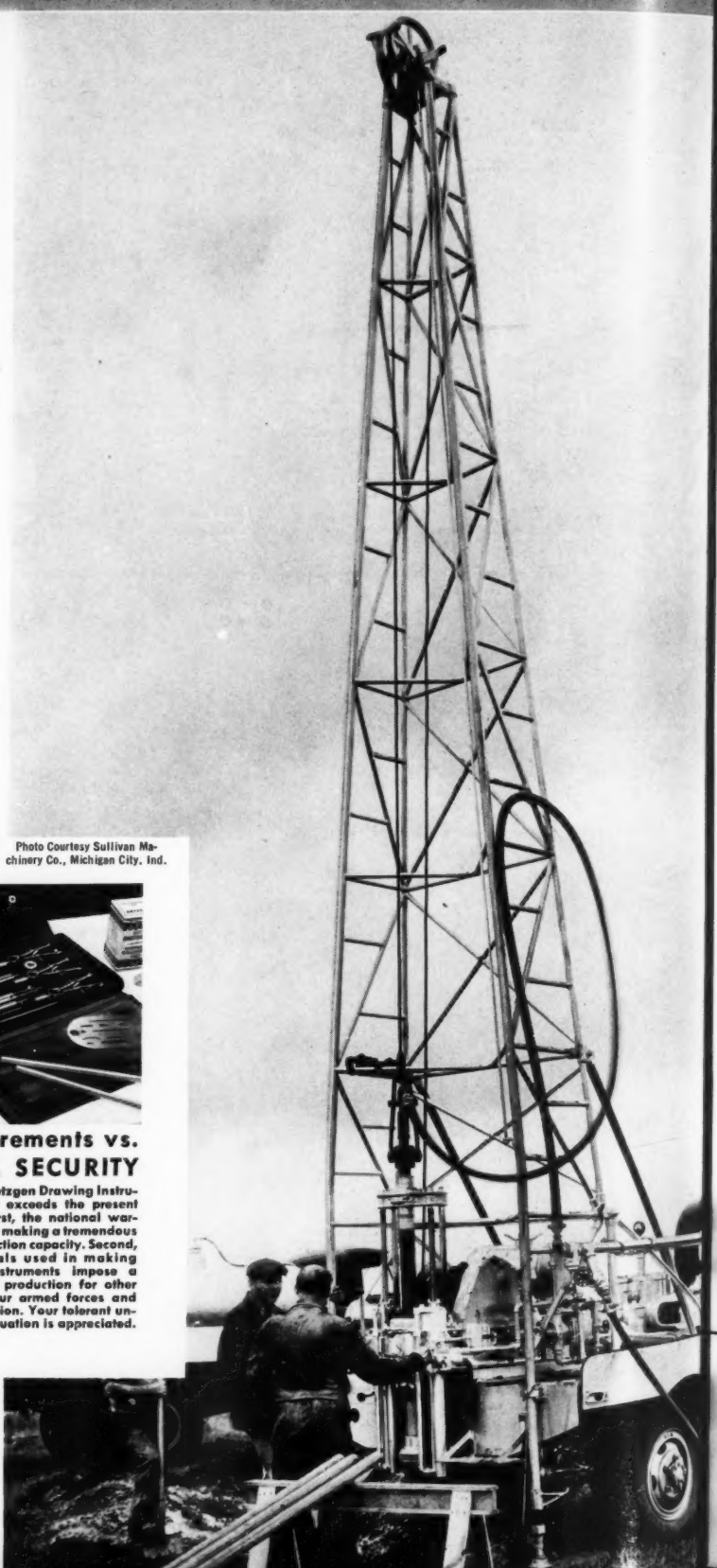

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INDUSTRIAL ARTS and VOCATIONAL EDUCATION

VOL. 31 MAY, 1942 Number 5

THE REQUISITION NUMBER

The May Requisition number of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION assumes a position of considerable importance now that America has entered the all-out phase of war. Present conditions in the Pacific demonstrate the dire need of producing war equipment and munitions of all kinds.

The summer months permit the schools to step up the tempo of wartime defense training. This will require careful analysis, considerable study, and much planning.

It is hoped, that because of the need for this wartime training, both the equipment and the materials needed by the schools will be given favorable priorities.

WHAT ABOUT SUMMER SCHOOL

Under present conditions, shop teachers should not overlook the need of keeping up their professional improvement. The highest type of training for shop teachers is required if the preparation of our youth is not to be sacrificed in this time of stress and strife.

The advertising section of the March, April, and May issues of this magazine carry statements about the summer school programs of the following teacher-training institutions. Those interested should not fail to study these offerings.

Bradley Polytechnic Institute, Peoria, Ill., May 18–June 20; June 22–July 25; July 27–August 29.

Kansas State Teachers College, Pittsburg, Kans., June 1–July 31.

Oregon State College, Corvallis, Ore., June 20–July 25; July 25–August 29.

Pennsylvania State College, State College, Pa., June 8–June 26; June 29–August 7; August 10–August 28.

The Stout Institute, Menomonie, Wis., June 22–August 21.

University of Minnesota, Minneapolis, Minn., June 15–July 24; July 27–August 28.

THIS MONTH'S COVER

The cover illustration chosen for this issue shows a welder accomplishing the unusual feature of welding with an electrode in each hand. The two-fisted welder is R. H. Oliver, of St. Louis, Mo. He is manipulating one electrode receiving current from a 400-ampere welder, and the other is drawing current from a 150-ampere welder.

Photograph, courtesy of The Lincoln Electric Co., Cleveland, Ohio.

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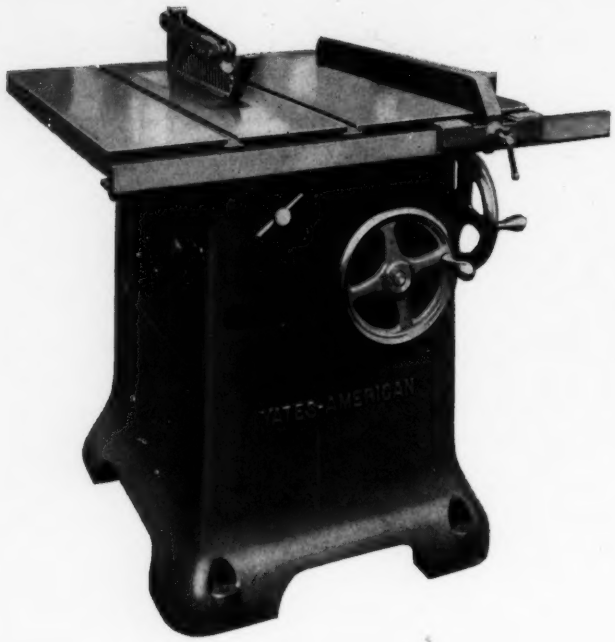


G-87 VARIETY SAW

VARIETY Saws, like all woodworking machines used in the school shop, are generally subject to severe usage. The many forms of abuse which student operators so ingeniously seem able to devise, are often enough to tax ordinary saws — but not the G-87 shown here. This saw asks no favors, requires no special consideration. In fact, large numbers of these tilting arbor saws are bought each year for industrial use — at the present time you'll find many of them hard at work in vital defense industries.

Much of the sturdiness and rigidity that the G-87 possesses is derived from its heavy, one-piece, cast-iron frame. This greater rigidity, in turn, provides greater accuracy because the moving parts cannot be sprung out of line by strain or pressure.

In addition, there are many other features of design that contribute to the unusual ruggedness of this saw. The steel saw arbor is extra heavy and is mounted in grease-lubricated ball bearings of generous size. The swinging frame which carries the saw arbor and motor units is mounted on accurately machined segment gibs, located and doweled in place. This forms a firm support which tilts easily and maintains perfect alignment. The operating screws on both the tilting mechanism and the vertical adjustment of the saw are supported on roller thrust bearings. Let us send complete information. Write today.

YATES-AMERICAN MACHINE COMPANY • BELOIT, WISCONSIN

Short Talks on Wood

BUTTERNUT (*Juglans cinerea*)

Often marketed as white walnut. Botanically it is a true walnut but it differs radically in most respects from black walnut. The wood is light, soft, coarse-grained and weak. Seasons well and is easily worked. Has an attractive grain and takes a good polish. Light in color.

Not much in demand as a cabinet wood, but is used for decorative purposes, especially as a veneer. Used to a limited extent for interior finish and general millwork. A yellow or orange dye can be made from the green husks of the nut.

Is generally found east of the Mississippi River from southern Canada to northern Florida, particularly in the Ohio River basin. Prefers the rich, moist soil on lower slopes and along streams. Rapid in growth when conditions are favorable. Does not thrive on poor soil.

In the open, its stout limbs extend horizontally from the trunk to form a low, wide-spreading head which gives it a distinctive appearance. Is frequently used for park and yard plantings. Seldom exceeds 50 feet in height and 2 feet in diameter.

The bark on older trees is brownish-gray and is deeply furrowed. The leaves are compound, alternate, from 15 to 30 inches long, and usually have from 11 to 17 leaflets which are yellowish-green, pointed and finely toothed. Bears rough, oval, pointed nuts contained in sticky, non-splitting husks. Kernel is sweet, oily and edible.

To date, thirty-five brief articles similar to the one above and dealing with the more commonly used woods have appeared in these ads. As in the past, we continue to invite your suggestions as to the species of wood you would like featured in this series.

YATES-AMERICAN

INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

Vocational and Avocational Interests of Students in Grades VI and VII

LESTER V. HILL*

One of America's biggest businesses today is the education of the masses. The rapid march of civilization in recent decades has made more pronounced the problems involved in conducting such a business. The sudden collapse of the struts supporting a seemingly well-constructed political and economic social order, the findings of science, and the development of a new social and educational philosophy have redirected the general trend in all education. The chaotic state of all aspects of modern life, coupled with the uncertainty of future events, has caused leaders and many laymen to cast suspicious eyes toward the functions of education and toward the effectiveness of our schools in an advanced society.

Those educators who have been keen enough to catch the spirit of the times and accept the challenge to cast aside time-worn methods and techniques of instruction for a newer philosophy are known as progressives. The philosophy as indorsed by the progressives points to newer scientific methods and techniques of classroom instruction. The child must eventually be guided rather than taught lessons. The teacher must fade into the background, while chief considerations must be given to the whole child: child interests, child desires, and child purposes, leaving the center of choice within the child. The school must be a laboratory where child activity dominates and teacher activity is limited to assisting, guiding, and cooperating with the child in his efforts to solve problems and interpret life. As a natural reaction to an age of great industrial specialization, social and economic as well as educational trends have been marked by individualization. Greater emphasis is placed on individual differences. Particularization of the child is one of the newer basic concepts of effective educational methods. Especially should this be true in a modern functional junior and senior high school. The primary purpose of all education is the complete, natural development of an individual — a socialized being. The purpose of education is to so stimulate and aid the individual to solve the problems which he meets today, that as a result, he will have equipped himself to solve the problems of tomorrow. A sound element of philosophy upon which industrial arts is based is: "To help the pupil do better those things which he would naturally do anyway."

The teacher must maintain a scientific attitude toward all education. He must inspire, direct, and guide pupils toward the development of an increasingly broad and generous and fair-minded outlook on life. The teacher must know the child and be possessed with a comprehensive appreciation of child life, child interest, and child choices. The teacher should have a scientific eye that can analyze the psychological elements that individualize each pupil, and yet, at the same time behold the complete individual functioning cooperatively as a member of society. The teacher, again, should have a working knowledge of motives actuating pupil activity. In pondering the newer demands of teacher efficiency, many teachers have protestingly shouted, "the teacher is the subject." Lest we forget, all arts require a high degree of finesse of their artists. For after all, true teaching should consist of varied methods of guiding, directing, and counseling pupils, and not primarily of teaching history, English, and the like.

Recent trends in educational practices point to a wider application of the principles of individualizing the individual pupil. The case method in education has come to mean analyzing the cumulative case record of each pupil to determine his abilities, interests, aptitudes, accomplishments, and plans so that a program of work and guidance may be arranged to meet his individual needs. Schools are widely adopting such methods as the cumulative pupil-case-record cards. Such case-record cards aid the teacher not alone in meeting individual needs, but also in adjusting curriculum content and method.

The industrial-arts teacher has a rich field which offers opportunities for intense application of cumulative case histories and all the other progressive trends in educational content and methods heretofore mentioned. Industrial arts, like other branches of general education, has changed and is changing its philosophy, seemingly, following the trend of the *New Deal* administrative policy: *Centralization.* Subjects are losing their identity as separate subjects. Educators are interested only in subjects as they are needed to help the pupil to solve problems that he sees about him in his community. In the light of well-established thought, one would say that all teaching materials and subject matter are fast becoming individualized, yet the bounds of industrial arts are broadening and becoming richer. In these efforts toward centralization, nonessentials are unhesitatingly eliminated, and every activity must show justification for its inclusion. Clear-cut aims and objectives undoubtedly point to worth-while goals based upon sound principles. The result is unmistakably a *new era in education.*

Why the Study Was Made

In the discussion of the underlying philosophy of a new era in education, several newer demands on the progressive teacher were pointed out. To know the pupil, his needs, desires, interests, abilities, and aptitudes, is the first all-important step in aligning oneself with this cavalcade of education. Modern scientifically managed industrial plants study and thoroughly know and understand their products. Likewise, it is just as important, if not more so, that the teacher of today know and understand the pupil. Let us consider for a moment the following six questions, which, due to their importance as determinants of a successful industrial-arts course, led the writer to make this study. While the data shown here was gathered in 1935 and 1936, it nevertheless contains many implications of real value at the present time.

1. How can the industrial-arts teacher contribute to general education and help the pupil solve his personal problems?
2. What factors should be considered when adapting school activities to pupil needs and interests?
3. What important out-of-school factors greatly influence a pupil's school behavior and response?

*Richmond, Va.

1. Name..... Age..... Grade..... I.Q.....
2. Address.....
3. Father's occupation.....
4. Mother's occupation.....
5. Please place a number on the line in front of each of the following hobbies that you like especially well. Place a "1" before the hobby that you like best, a "2" before the hobby that you like next best, a "3" before your third best, and so on:

.... Baseball
.... Boating
.... Building model boats
.... Building model airplanes
.... Drawing
.... Doing electrical job
.... Woodwork
.... Hiking
.... Doing home-repair jobs
.... Fishing
.... Shoeshines

6. Which of the following are you anxious to do this term? Place a "1" in front of your first choice, a "2" in front of your next choice, and so on:

.... Electricity
.... Woodwork
.... Metalwork
.... Concrete
.... Shoe repairs
.... Fix things

7. List at least two things that you want to make this term:
(a)..... (b)..... (c).....
8. Do you work at a job after school?.....
9. Doing what?.....
10. Do you like your job?.....
11. What is your occupational choice?.....

My Pledge

I realize fully that the shop is a place in which to enjoy working. I will, therefore, do my best to play square with other pupils and with my instructor by paying attention to my own work and not interfere with others. I do not want to be bothered by the thoughtlessness of anyone else, and will try to be *honest* and *honorable* at all times.

Signed.....

Fig. 1. The questionnaire

4. To what extent can the industrial-arts teacher satisfy a need felt in the life of the pupil and community?

5. In industrial-arts courses, which of the pupils' interests are avocational? Which are vocational?

6. How can the industrial-arts teacher stimulate avocational interests and inspire vocational interests?

In the preparation for this study a questionnaire was drawn up and duplicated, a copy of which was made up in work-pad form and passed to each boy in the sixth and seventh grades of the Dunbar, George Mason, and Buchanan schools of Richmond, Va. A sample of the copy used is shown in Figure 1. You may note, however, that the pledge which the boys were asked to sign had little to do with the core study. It did reveal, though, the attitude of two pupils who refused to sign it.

Data Concerning the Boys

1. Race: Negro
2. Schools: Dunbar, George Mason, and Buchanan
3. Grades. Sixth and seventh
4. Total number of boys tested: 242
5. Range of ages: 10 to 17 years inclusive
6. Average age: 13 years

The Study By Schools

Dunbar School. The industrial-arts shopwork begins in this school in the fifth grade and continues through the seventh grade. However, only the boys of the sixth and seventh grades were tested in this study. Here shop activities varied, with home mechanics as a core interest. The pupils responded readily to the questions submitted to them. From Table I it is easy to see that boys will be boys, and that baseball is still America's favorite

Table I. Ranking of hobbies among boys at Dunbar School

Hobbies	*Frequency*	*Rank*
Baseball	51	1st
Boating	11	2nd
Drawing	13	3rd
Woodwork	10	4th
Shoeshine	9	5th
Doing home repairs	11	6th
Doing electrical jobs	5	7th
Hiking	6	8th
Building model boats	7	9th
Fishing	6	10th
Model airplane building	1	11th

Question	*Yes*	*No*
Do you work after school?	32	47
Do you like your work?	29	

Types of Industrial Units	*Frequency*	*Rank*
Woodwork	44	1st
Electricity	17	2nd
Metalwork	13	3rd
Home mechanics	7	4th
Shoe repair	6	5th
Concrete	5	6th

Table II. Vocational choices of boys and occupational status of parents at Dunbar School

Sons' Vocational Choice	*Frequency*	*Father Occupation*	*Frequency*	*Mother Occupation*	*Frequency*
Doctor	14	Tobacco factory	12	Housekeeper	37
Carpenter	12	Dead	11	Maid	14
Mail carrier	10	Unemployed	4	Tobacco factory	10
Undecided	9	Paper-mill worker	4	Dead	8
Auto mechanic	5	Steel-mill worker	4	Laundry	8
Chauffeur	3	Unknown	4	Unknown	3
Undertaker	3	Plasterer	3	Waitress	1
Electrician	2	Chauffeur	2	General cleaning	1
Plumber	2	Janitor	2	Teacher	1
Teacher	2	Iron foundry	2	Not reported	6
Fireman, R.R.	2	Brickyard	2		
Bicycle mech.	1	Carpenter	2		
Taxi driver	1	R.R. Fireman	2		
Bellboy	1	Lunchroom business	1		
Artist	1	Barber	1		
Bookkeeper	1	Blacksmith	1		
Farmer, general	1	Relief	1		
Farmer, poultry	1	Cement finisher	1		
Lawyer	1	Cleaning — pressing	1		
Professor	1	Retired	1		
Painter	1	Radio mechanic	1		
Airplane mech.	1	Fish market	1		
Cabinetmaker	1	Pullman porter	1		
General repair	1	Elevator operator	1		
Insurance agent	1	Minister	1		
Shoemaker	1	Pipemaker	1		
		Warehouse clerk	1		
		Stove factory	1		
		Business	1		
		Farmer	1		
		Painter			
		Foreman	1		
		Service station	1		
		Dentist	1		
		Lumber piler	1		
		Tanner	1		
		Shipping clerk	1		
		Not reported	1		

sport, for we find baseball rated as the hobby liked best. In contrast with results at the other two schools, boating as a hobby was rated as second choice, while at the Buchanan and the George Mason schools, boating was rated sixth and eleventh, respectively. This may be justified in part by reason of the fact that the boys of the Dunbar School live in the vicinity of two lakes and navigable sections of the James River. As in the other schools, the industrial unit rated as first choice showed great interest in woodwork, with electricity as a second choice. Out of the 79 boys questioned, 32 boys worked at gainful jobs after school (40 per cent). In three cases of after-school work, the duties kept the workers up as late as 11 and 12 o'clock at night.

Table II gives a complete list of vocational choices in the order of frequency chosen. Choices that attracted attention were: bicycle mechanic, general farmer, and poultry farmer. The list of parents' occupations shows a large percentage of unskilled factory workers, with a few skilled tradesmen. Forty-four per cent of the mothers worked out, which means that this percentage of boys had home duties to perform which normally are parent duties. One should note that in this group 14 per cent of the fathers were reported dead, another social factor that influences school response. Of the fathers reported employed, 49 per cent were unskilled mechanical workers, 12 per cent semiskilled, 15 per cent skilled, and three fathers were reported professional workers. During these days of high unemployment, only 6 per cent of the fathers were reported unemployed or on the relief roll.

Carrying newspapers is still very popular as an after-school task as evidenced by its frequency in Table III. In this table is listed also favorite projects.

George Mason School. Industrial-arts shopwork begins in this school in the sixth grade and continues through the seventh grade. There was a total of 102 boys who participated in this study. Pupils of this group seemed to lack the potent inertia that persists with the boys at Dunbar School. To these, shopwork is accepted more as a part of the school's daily routine program. As with the groups at the other schools, baseball was the most popular hobby, with drawing as a second, as shown in Table IV. Woodwork, here again, was reported first choice of the industrial units chosen. Fifty-one per cent of the boys worked at gainful jobs after school. As indicated in Table V, 25 per cent of the boys selected *mail carrier* as their vocational choice. Among interesting vocational choices, we find: G man, prize fighter, and orchestra leader. This group showed 16 per cent of the fathers as dead. Of the fathers reported as gainfully employed, 60 per cent were unskilled workers, 20 per cent semiskilled workers, 12 per cent skilled workers, and a little less than 8 per cent professional workers and business owners. Forty-nine per cent of the mothers were listed as gainfully employed. The frequency of the parents reported as tobacco factory workers at the three schools show the importance of the tobacco industries as an economic stay of Negro life in these sections of Richmond. Unlike the Dunbar group, there were three cases of boys choosing the vocation of their fathers, as given in Table V. Table VI shows a list of after-school jobs. Carrying papers headed the list. A group of favorite type projects is listed in the order of frequency reported.

Buchanan School. Industrial-arts shopwork in this school begins in the sixth L. grade and continues though the seventh L. grade. The total number of boys used in this study was 59. Unlike the other two groups, this school seemed to display training of militaristic discipline, a type of discipline belonging to the old school of educational thought. This group reacted more positively to grasping skills and the mechanics of subject matter, but were far less responsive to the cultivation of appreciations and understandings. On several occasions the writer has given duplicate tests on related subject matter to the three groups of boys, and compared the results. Each time the Buchanan boys have made the highest general score as well as the highest average score. In light of the monitorial nature of the discipline which has in a way characterized this school for some time, it can be understood why this group responded in this manner. For some time subjects have been taught, and very well taught. Thus we sense a gradual shift in educational philosophy and emphasis put on the training of pupils and not the teaching of subject matter. Here again, as shown in Table VII, baseball was reported first choice of hobbies. Here fishing as a hobby has moved up to third choice. This may be by reason that these boys live in Fulton and other sections of the city adjacent to the banks of the James River. It is strange to note that this group of boys should report household repairs as second choice for the industrial unit, yet engage less in such activities than the other groups. Of the 59 boys questioned, 31, or 53 per cent, worked gainfully at jobs after school. There were two cases of boys choosing their fathers' vocation as their vocational choice. Looking at Table VIII, we see that 27 per cent of the vocational choices are for carpentry. Among interesting vocational choices indicated were bootblack, army officer, professional baseball player, and dairy farmer. Fifty-three of the vocational choices reported fall in the mechanical group. Of the fathers listed as gainfully employed, 65 per cent are classed in the unskilled mechanical group. According to the report, 43 per cent of the mothers were gainfully employed. It was very interesting to note that among the after-school jobs reported, shoe shining was rated first place and likewise the most popular type of project was reported to be the shoeshine box as shown in Table IX.

General Findings

In summarizing, it would be well to explain some items discussed in this article. (1)

Table III. Types of after-school jobs and choice of shop projects at Dunbar School

Types of after-school jobs	*Frequency*	*Favorite type job*	*Frequency*
Carry papers	7	Footstool	19
Cut wood	6	Magazine stand	12
Deliver groceries	4	Wall shelf	11
Shine shoes	3	Reading lamp	11
Scrub and clean	2	Airplane	10
Wash dishes	1	Checkerboard	10
Repair jobs	1	Shoeshine	9
Yard boy	1	Smoking stand	9
		Medicine cabinet	9
		Book ends	8
		Bookrack	7
		End table	6
		Fix chairs	6
		Shadow lamp	5
		Scooter	5
		Repair shoes	4
		Repair home articles	4
		Repair toys	3
		Model boat	3
		Bottle lamp	2
		Wall-bracket lamp	2

Table IV. Ranking of the hobbies of boys at Geo. Mason School

Hobbies	*Frequency*	*Rank of Choice*	*Questions*	*Yes*	*No*
Baseball	51	1st	Do you work after school?	52	60
Drawing	19	2nd	Do you like your work?	50	2
Building model boats	23	3rd			
Building model airplanes	18	4th			
Fishing	9	5th			
Doing home repair jobs	12	6th			
Woodwork	15	7th			
Hiking	13	8th			
Doing electrical jobs	11	9th			
Shoe shining	12	10th			
Boating	2	11th			
Skating	2	12th			
Bicycling	2	13th			
Football	1	14th			
Swimming	1	15th			
Industrial units chosen					
Woodwork	51	1st			
Electricity	18	2nd			
Fix things	14	3rd			
Metalwork	15	4th			
Concrete	15	5th			
Shoe repair	11	6th			

Table V. Vocational choices of boys and occupational status of parents at Mason School

Sons' Vocational Choice	*Frequency*	*Father Occupation*	*Frequency*	*Mother Occupation*	*Frequency*
Mail carrier	28	Dead	16	Housekeeper	44
Doctor	15	Tobacco factory	16	Maid	18
Auto mechanic	9	Unknown	6	Tobacco factory	13
Undecided	9	Unemployed	5	Laundry	12
Carpenter	5	Relief	5	Dead	5
Funeral director	5	V.E.P. Co. work	5	Nurse	1
Sailor	4	Janitor	3	Baker	1
Shop teacher	3	Farm hand	3	Dressmaker	1
Train porter	2	Redcap	2	Cook	1
Lawyer	2	R.R. yards	2	House cleaner	1
Chauffeur	2	Baker	2		
G man	2	Grocery warehouse	4		
Prize fighter	2	Roofer	2		
Truck driver	2	Peddler	3		
R.R. section hand	1	Truck driver	3		
Ice-cream maker	1	Iron foundry	3		
Painter	1	Wood business	2		
Factory worker	1	Freight station	1		
Wood business	1	Ice-cream maker	1		
Taxi driver	1	Brakeman	1		
Artist	1	Theater porter	1		
Pharmacist	1	Sailor	1		
Locomotive fireman	1	Clerk, R.R.	1		
Salesman	1	Plumber	1		
Surgical doctor	1	Blacksmith	1		
		Brickmason	1		
		Lumber yard	1		
		Laundry	1		
		Rubber factory	1		
		Candy factory	1		
		Plasterer	1		
		Machinist	1		
		Paper hanger	1		
		Repairman	1		
		Farmer	1		
		R.R. Fireman	1		
		Teacher	1		

Table VI. Types of after-school jobs and projects of boys at Geo. Mason School

Types of after-school jobs	*Frequency*	*Favorite type job*	*Frequency*
Carry papers	11	Shoeshine box	34
Cut wood	6	Scooter	11
Sell papers	4	Wall shelf	10
Scrub and clean	3	Wall lamp	10
Grocery-store porter	3	Book ends	10
Delivery boy	2	Smoking stand	10
Sell vegetables	2	Shadow lamp	7
Paint	2	Magazine stand	5
Deliver shoes	2	End table	5
Peddler's fish wagon	1	Plant stand	5
Collect garbage	1	Small hanging shelf	4
Run errands	1	Hall tree	4
Grocery boy	1	Sled repair	4
		Table repair	4
		Towel rack	4
		Hat rack	3
		Medicine cabinet	3
		Reading lamp	3
		Auto repairs	3
		Model boat	3
		Footstool	3
		Ash tray	3
		Chair repairs	3
		Serving tray	2
		Ironing board	2
		Birdhouse	2
		Model airplane	2
		Shoe repairs	2
		Concrete flower box	2
		Workbench	2
		Picture frame	2
		Desk	1
		Radio set	1
		Gen. household repairs	1
		Dustpan	1
		Wagon repairs	1
		Rowboat	1
		Flower trellis	1

Table VII. Frequency and choice of hobbies at Buchanan School

Hobbies	*Frequency*	*Rank of Choice*	*Questions*	*Yes*	*No*
Baseball	26	1st	Do you work after school?	31	28
Drawing	9	2nd	Do you like your work?	30	1
Fishing	7	3rd			
Shoe shining	8	4th			
Hiking	5	5th			
Boating	6	6th			
Building model boats	6	7th			
Woodwork	4	8th			
Doing home repair	3	9th			
Building model airplane	2	10th			
Doing electrical jobs	2	11th			
Industrial units chosen					
Woodwork	16	1st			
Household repairs	15	2nd			
Shoe repairs	6	3rd			
Electricity	4	4th			
Metalwork	8	5th			
Concrete	10	6th			

Table IX. Types of after-school jobs and choices of projects at Buchanan School

Types of after-school jobs	*Frequency*	*Favorite type job*	*Frequency*
Shining shoes	4	Shoeshine box	16
Paper carrier	3	Wall shelf	15
Sell papers	3	Smoking stand	12
House cleaning	3	Flower box	6
Cut wood	2	Scooter	4
Porter in market	1	Medicine cabinet	2
Porter in grocery store	1	Model boat	2
Peddler's wagon	1	Ash tray	2
Hauling wood	1	Shoe repair	1
Sell wood and coal	1	Book ends	1
		Airplane	1
		Wagon repairs	1
		End tables	1
		Repair sled	1
		Footstool	1
		Bench	1
		Magazine stand	1

Those projects listed under "Favorite type jobs" are not necessarily articles actually under construction in the school shops, but rather a catalog of projects as reported in answer to item number seven as listed in Fig. 1. (2) A number of parents' occupations were reported unknown. Upon questioning pupils making such reports, the writer learned that this term was used to indicate that: (*a*) parentage was unknown; (*b*) or parents' whereabouts was unknown due to domestic relations and difficulties. (3) "Favorite Industrial Units." These shops are organized after the pattern of a general shop. The general-shop idea calls for a variety of activities organized about short unit courses or industrial units of work. Those industrial units as listed in this treatment represent the range of variety in activities that the shop equipment will permit. Hence the industrial unit becomes the core interest (some call it the unifying factor) about which a number of pupil activities are grouped. (4) "Housekeeper" as listed under mother occupation indicates that the mother was not gainfully employed, but remained at home and cared for her home and sent the child out to school properly cared for.

Social and Economic Implications

When obtaining information concerning pupils it is only natural to turn to the pupils themselves for some important data. While these pupils may not always represent the most dependable source of information, yet in many cases it is the most practical and only possible source.

There can be little question as to the influence exerted by social and economic factors on the school behavior of the pupil. Many interesting and fact-revealing studies have been made in this connection. Johnson[1] in his study, listed 18 items as home factors conditioning school behavior. According to Johnson's study, and verified by this study, "The occupation of parents indicate roughly their social and economic status, cultural background, and the contact gained by the pupil in his home. The employment of the mother outside of the home suggests lessened parental supervision of the activities of the pupil. It may indicate also a lower economic status, although the increase of married women make this a precarious influence."[2] As found by this study, we list below important social and economic factors as having direct influence on the pupil's ambition, avocational interests, and vocational choices:

1. Dead parents
2. Parentage unknown
3. Nature of the occupation of the parents —52 per cent unskilled workers, as obtained from the data shown in Table II.
4. After-school jobs and duties — 48 per cent reported gainfully employed after school.
5. Home surroundings
   - *a*) Cultural background of home and neighbors
   - *b*) Residential improvements
   - *c*) Many lived in undesirable neighborhoods, with meager city improvements

During the period between December, 1934, and February, 1935, in the shop at Geo. Mason School, 83 shoe-repair jobs were done. In 80 per cent of these cases it was reported that the parents were unable to pay for such repairs at a commercial shoe-repair shop. This meant that school attendance was at stake. During this same period seven repair cases were requested by the principal for pupils not enrolled for shopwork, but whose school attendance was at stake and parents were of low economic means.

[1]Johnson, Lamar., U. Minn. 1927.
[2]Koos and Kefauver, *Guidance in Secondary Schools*, p. 244.

Educational Implications

It has already been pointed out how important it is to fit the curriculum to the child. Again, let it be stated that it is highly desirable that the teacher have appreciation of the most important factors influencing the school behavior of each pupil, hence the case method in education is fast becoming increasingly more important in progressive educational practices. The factor accorded highest value, is whether or not the parents are living. In this study 22 per cent of the parents were dead, and 6 per cent reported as unknown, due to domestic conflicts and illegitimacy. This data is significant in affording some indication of whether the pupil has normal parental companionship and assistance in making the many adjustments required during school. As reported by Johnson[3] we concur that home duties and after-school jobs often interfere with the pupil meeting the requirements of the school satisfactorily. Flagging interest, and a decided lack of potential vigor in many cases can be traced to lack of sleep and long exhausting hours of labor after school. Knowledge of these factors should be scientifically studied and systematically recorded by the school teacher. Such knowledge by the teacher and adjustments by the school have often worked wonders for a failing pupil. For the school to intelligently work with the pupil, and make adjustments as influenced by home surroundings in the progressive school, there must be a pupil-personnel division consisting of the following departments:

1. Medical
2. Psychopathic and mental hygiene clinic
3. Research and recording
4. Placement (work permits)
5. Visiting teacher

The work of these departments should be closely co-ordinated, with services and records of each department closely tied up with the classroom activities and teaching methods. The school should check the health of all pupils to insure against malnutrition and other child ailments common among children of a low economic status. The research division should inform the teacher of the mental efficiency of each of her pupils. Such facts would clarify instances where mental ability and home surroundings are difficult to disassociate. Those in charge of placement and the granting of work permits should use the case method and study the cumulative case record cards compiled by the teacher. The visiting teacher should be schooled in social case methods and work in close cooperation with the classroom teacher that the pupil may be adjusted to school and the curriculum adjusted to the pupil. This business of fitting the curriculum to the child has many aspects of social case work. The varying environmental conditions of these pupils must be accepted as a challenge. Very often the teacher finds it puzzling to account for lack of interest, drowsiness, absence of physical vigor, and an attitude of indifference toward regular curriculum and extracurricular activities. The occupational group from which the individual comes is indicative of the probabilities of school success. Towell,[4] in his study, found that none of the pupils from the common labor group participated in club and other such activities. "The group with fathers in personal and public service and in the trades were likewise low. The environmental conditions of these pupils seem to vary in the extent of provision for socializing opportunities which give them the desire of freedom to engage in the club activities of the school." Table II gives the distribution of the occupational groups from which the pupils, in this study, come.

[3]*Ibid.*, p. 12.

Application to Industrial Arts

It has been previously pointed out that the changing philosophy of industrial arts has brought about newer shop methods and organizations. The history of industrial-arts education is well marked and defined. If there is any branch of education in which pupil interest should be the motivating factor, it is industrial arts. Pupil activity must be based on pupil interest. Hence, it is highly important that the shop teacher know of the things in which his pupils are interested. Here the cumulative case-record card would be a key

[4]Towell, J. F., "The Social and Educational Status of the Children in a Residential Suburban Community," *School Review*, January, 1929.

Table VIII. Vocational choices of boys and occupational status of parents at Buchanan School

Sons' Vocational Choice	*Frequency*	*Father Occupation*	*Frequency*	*Mother Occupation*	*Frequency*
Carpenter	16	Dead	11	Housekeeper	12
Mail carrier	10	Tobacco worker	5	Tobacco factory	8
Auto mechanic	4	R.R. yards	4	Maid	7
Doctor	4	Clean R.R. cars	2	Laundry	2
Bootblack	3	Locomotive fireman	2	Dead	2
Undecided	3	Unemployed	2	Sell lunches	1
Undertaker	3	Relief	2	Waitress	1
Butcher	2	Butcher	2	Not reported	15
Truck driver	1	Auto mechanic	1		
Prize fighter	2	Factory worker	2		
Barber	1	Fur cleaner	1		
Typist	1	Train porter	1		
Postal delivery	1	Barber	1		
Mail clerk	1	Gen. labor	1		
Lawyer	1	Store porter	1		
Army officer	1	Carpenter	1		
Dairy farmer	1	Shoe factory	1		
Painter	1	Truck driver	1		
Chauffeur	1	Wood business	1		
Baseball player, Pro.	1	Not reported	15		
Builder	1				
Tailor	1				

source of such information. When this is not to be had, the information should be obtained directly from the pupil. The teacher should keep all such information clearly before him when setting up objectives and shaping his course of study.

The advent of the general shop has introduced new practical and worth-while objectives and goals. The world-wide depression engulfed all branches of education with the principle of stringent economy. All luxuries in education were cut and every activity called on to show justification for its inclusion in the curriculum. Every industrial-arts activity must show its contribution to general education. To what extent does any subject contribute what it purposes to contribute to the general education of the pupil? To what extent does industrial arts realize the objects and goals set up? Such questions can be answered adequately only by research study. When such a study is made by a teacher it may easily serve as a check as to the effectiveness of his subject and his teaching. Some of the foremost objectives of the course as organized in the schools herein mentioned, may be listed briefly as:

1. Exploratory
2. Handiman abilities
3. Avocational
4. Purchaser and consumer appreciations
5. Creativeness
6. Guidance
7. Social habits ..

The exploratory nature of the junior high school must be kept clearly in mind. On this level the concept of exploration should penetrate all subjects and should not be restricted solely to certain industrial courses where exploration is more dominant. Hence, justification of industrial arts can be based on the exploratory nature of its activities. The extent of realization of worthy goals previously listed as aims of Industrial Arts was checked in this study.

Conclusions

From consideration of the materials of this study certain well-defined conclusions are very apparent:

1. That the philosophies of general education and industrial arts are changing.
2. That greater emphasis is being placed on teacher efficiency.
3. That educational philosophy is influenced by social, economic, and political trends.
4. That modern educational methods tend to individualize each pupil.
5. That particularization of the pupil means the fitting of the curriculum to the child.
6. That teachers must eventually inspire, guide, and direct pupils rather than teach subjects.
7. That every activity is being called upon to show justification for its inclusion in the curriculum.
8. That social and economic factors have a great deal to do with the school response of a pupil.
9. That the school should have a pupil personnel division.
10. That teachers should have broad scientific attitudes.
11. That the objectives of industrial arts are justified as contributing to the general education of the pupil.
12. That there is a high correlation between general intelligence and achievements in industrial-arts shopwork.
13. That the avocational and vocational interests, and the selection and participation in industrial-arts activities of pupils are directly influenced by such social and economic factors as:
    - *a*) Loss of parents through death, divorce, or abandonment.
    - *b*) Nature and classification of parents' occupations.
    - *c*) After-school jobs and duties.
    - *d*) Home surroundings and background.

Suggestions for Further Study

1. Extent of vocational guidance in the junior high school industrial-arts shop.
2. Centers of interest for industrial arts.
3. Methods of industrial unit selection.
4. Methods for the selection of shop activities.
5. Interests of pupils in industrial-arts shops.
6. The functional extent of industrial-arts courses.
7. The function of industrial arts in modern education.
8. Social factors influencing industrial-arts courses.
9. How industrial arts contributes to the general education of the pupil.
10. What activities to teach in a general shop.
11. What and how to select industrial units for a general shop.
12. Some common industrial units being taught.

Can Our Vocational Schools Help The Blind?

GEORGE L. HOWEILER*

Unemployment is undoubtedly the most crucial problem which confronts the overwhelming majority of blind persons throughout the United States today. Truly heroic efforts are constantly being made by government, philanthropic organizations, and interested individuals to bring about its solution. Millions of dollars are spent each year in these efforts. In the final analysis, it is a problem toward which much of the work for the blind is directed. And yet, with all these efforts and monetary expenditures, only about 2500 out of an estimated total blind population of some 250,000 are actually earning a self-respecting livelihood in our competitive economic system.[1] That is to say, approximately 1 per cent of the blind in this country are making their own way, while the remaining 99 per cent are more or less dependent upon public or private assistance.

To the average layman, such a situation is entirely reasonable. He finds little difficulty in explaining it. Blindness to him means groping, stumbling, dire helplessness. It means a drastic curtailment of virtually all the activities to which man subscribes, especially those of an economic nature. True, blind persons have been known to play musical instruments, tune pianos, cane chairs, weave rugs, make baskets, and perform a number of similar tasks. But what of that? These are but minor occupations. Their remunerative possibilities are generally small. Besides, only a small proportion of the blind are capable of engaging in them. Thus, the unemployment situation is clearly unavoidable, and any suggestion to the contrary is pure buncombe. So reasons the average lay American.

But in this instance the general public is apparently quite ignorant of fact. While it is true that the remunerative possibilities of chair caning, basketry, and the like, are not promising, the popular belief that the blind are inevitably restricted to these is enormous. Blind persons can be found competing in almost every major branch of our economic order. The American Foundation for the Blind, for example, lists no fewer than 112 ordinary occupations in which such handicapped persons are employed, and there is good reason to believe that this list should be revised upward.[2] Because of its extent, this list cannot be conveniently included here. However, a fairly complete picture can

*Aeneas, Wash.

[1]Clunk, J. F., "Employment Possibilities — Old and New," *Proceedings of the American Association of Instructors of the Blind*, 1940, p. 144.

[2]See bulletin, "Our Vocational Services," issued upon request by the American Foundation for the Blind, 15 W. 16th St., New York, N. Y.

be had from the results of a recent survey made by M. E. Frampton and H. G. Rowell of Teachers College, Columbia University. The survey tabulated in Figure 1 presents conclusive evidence that the blind, far from being limited to a few handicrafts, are capable of participating to a large extent in all major lines of economic enterprise.

List of Occupations	*Percentage of Employed Population*	*Percentage of Employed Blind*
Agriculture	26.3	13.2
Mining	2.6	.2
Manufacturing	30.8	43.1
Transportation	7.4	1.5
Trade	10.2	17.6
Public service	1.9	.5
Domestic service	8.2	5.5
Clerical service	7.5	3.9
Professions	5.2	14.0
Miscellaneous		.5

TABLE I.[3] Percentage of Employed Blind

The belief that only the select few, the 1 per centers, are capable of earning a self-respecting livelihood is likewise fallacious. According to most authoritative students of the problem, the proportion of employable blind is much greater than that which is actually employed. Dr. Harry A. Best, for instance, indicates that between 10 and 15 per cent are capable of achieving total self-support.[4] A similar estimate has been arrived at by Dr. Gabriel Farrell, director of Perkins Institution and the Massachusetts State School for the Blind.[5] Mr. Joseph F. Clunk, United States rehabilitation specialist for the blind, is even more optimistic. "On the basis of present-day definition of blindness," he writes, "we have every reason to assume that between 250,000 and 300,000 persons in this nation are blind and that from 20 to 25% of the group are employable."[6] Since only about 25 per cent of the blind are between the ages of 21 and 55,[7] his estimate therefore would seem to include all those of employable age. This estimate, however, is probably too high. In any case, it is safe to conclude that a much larger proportion of the blind are capable of making a living for themselves than is generally recognized.

Now, if the number of occupations available to blind persons is fairly extensive, and if at least half or more of the potentially employable blind are able to compete side by side with sighted persons, why are there only about 1 per cent of them doing so? Or, to ask this question differently, why are so many compelled to accept the taxpayer's money in the form of subsidies when they could and gladly would be self-supporting?

[3]From Frampton and Rowell, *Education of the Handicapped*, Vol. 11. Copyright, 1938, by World Book Co., Yonkers, N. Y.

[4]Best, H. A., *The Blind*, p. 46.

[5]Farrell, G., "Reflections From an Ivory Tower," *Proceedings of the AAIB*, 1940, p. 19.

[6]Clunk, J. F., "Employment Possibilities — Old and New," *Proceedings of the AAIB*, 1940, p. 144.

[7]Irwin, R. B., "The Blind and Resources for Their Aid," *What of the Blind?* Copyright by the American Foundation for the Blind, 1938.

Providing Vocational Training for the Blind

The problem of unemployment is linked largely to the problem of providing proper vocational training. As Dr. R. S. French has succinctly said, "the blind succeed best when their actual participation in a trade is preceded by a thorough apprenticeship or by an equally thorough trade training in a school fully equipped to give such education."[8] Blindness alone is a hurdle difficult enough to overcome. In conjunction with vocational unpreparedness, it is an almost insurmountable barrier to economic success.

Some idea of the extent of this vocational unpreparedness can be had from a recent study carried on in California. According to its findings, only 39.8 of the employed blind of that state had been trained for the occupation in which they were engaged at the time the survey was made, while 60.2 were reported as having had no training whatsoever. Since there is good reason to believe that the results of this study are representative of the nation as a whole, a more detailed examination of these results should be made. The results shown in Table II are self-explanatory.

Occupation	*Per Cent Trained For*	*Per Cent Followed*
Manufacturing and mechanics	5.2	11.9
Professions	8.1	36.6
Domestic service	1.9	3.9
Farming	2.6	3.5
Retail trades	0.0	32.8
Miscellaneous	22.0	11.3
No occupation	60.2	0.0

TABLE II.[9] Trained for Occupations

These are significant data. If over three fifths of the employed blind have had no previous training for their present occupations, is it not reasonable to presume that a similar lack of training prevails among the unemployed? Indeed, is it not reasonable to conclude that the proportion of unprepared unemployed blind persons is greater than that of the employed who had no specific preparation whatever? Small wonder that even in such an educationally progressive state as California "about 95 per cent of the blind have no earned income, and that a large proportion of the remaining 5 per cent derive their income from employment in sheltered workshops,"[10] thus, a thorough vocational training prior to actual participation in an occupation appears absolutely essential if the seriousness of this unemployment problem is to be substantially reduced.

Occupations for Which to Train

But how can the blind be given a thorough vocational training?

Tables I and II show that the majority are principally engaged in the professions, agriculture, trade, and manufacturing. Table I, for instance, reveals that 87.9 per cent of the employed blind are following these occupations. If public and clerical service are regarded as professional occupations, as they frequently are, this figure rises to 92.3 per cent. Virtually the same result is obtained from Table II. It is apparent, then, that a program for vocational preparation must be based primarily upon these types of occupations.

In regard to the professions, the matter of providing proper training is of no great concern. Our universities and colleges have been available to the blind almost from the beginning. With the aid of readers, blind youths encounter little difficulty in meeting the requirements of institution and family. In fact, many instances can be cited where such handicapped students have been graduated from schools of medicine, divinity, law, education, journalism, and business with the highest of honors. It should be borne in mind, however, that only the gifted can reap real success in these pursuits, and that the number of gifted blind persons is proportionately as small as the number of gifted sighted. Failure on the part of guidance counselors and educators to realize this has brought many a graduate of a school for the blind to disillusionment and despair.

Likewise, the matter of providing training in agriculture and related fields presents no serious obstacles. Agricultural schools and colleges are quite numerous and accessible. A number of blind students have been known to enroll in them from time to time. The chief difficulty here is that the majority of those who follow this group of occupations are, for one reason or another, unable to attend these schools and colleges. For them, however, Smith-Hughes training in a public school is both possible and practical. In those states where Smith-Hughes instruction is not offered or is limited to only a few schools, a certain amount of agricultural education can be provided for by the state institutions. If none of these is feasible, there still remains the alternative of correspondence courses. These are inexpensive and they can be made very practicable with the help of rehabilitation workers or home teachers.

As is quite apparent, the vocational preparation of blind persons for the professional and agricultural occupations is not a difficult matter. Rather, it is in the commercial and industrial occupations that the problem of providing proper vocational training really assumes large proportions. Here the conventional high school has little to offer in the way of a solution. Neither has the state institution, as it is generally organized today. To paraphrase the opinion of one authority, schools for the blind can only give prevocational ex-

[8]French, R. S., *From Homer to Helen Keller*, p. 201.

[9]"A Census and Economic Survey of the Blind in California," Department of Education, Bulletin No. 7 (1935).

[10]Perry, N. L., "The Possibilities for Remunerative Employment of the Blind in a Competitive Field," *Proceedings of the American Association of Workers for the Blind*, 1935, p. 45.

perience in a few broad fields and training in the basic skills common to the area chosen by the student for specialization.[11] This is very unfortunate, for these are the very occupations which hold out the greatest hope of economic success.

A suggestion has sometimes been made to the effect that regional vocational schools for the blind should be established. According to this plan, certain groups of states would cooperate in maintaining centrally located institutions. To these institutions, employable blind persons would be sent upon the recommendation of guidance committees or rehabilitation specialists. Here they would receive intensive training in one or more commercial and industrial occupations.

There is much to be said in favor of this suggestion. For example, trainees would have the benefit of highly specialized and efficient instruction. They would have the additional advantage of plant and equipment specially designed to meet their needs. However, this plan is not in keeping with the present trend of placing handicapped individuals whenever possible in ordinary schools, where their environment more nearly approximated real-life situations. Furthermore, it is doubtful whether states would agree to cooperate in such a venture, at least in the immediate future. Meanwhile something has to be done.

Apprenticeship As a Solution

In this connection the system of apprenticeship has been mentioned as a solution to the problem of providing vocational training. Unquestionably this would be the most satisfactory approach. From the standpoint of any prospective employee, blind or sighted, no training program carries with it quite the assurance of success as does one in which actual preparation for an occupation goes hand in hand with the actual participation in that occupation. The trouble, however, is that it is almost as difficult for a blind person to secure an apprenticeship as it is for him to secure a regular position. Most employers are hesitant about engaging a thoroughly trained individual if he is blind, to say nothing of one who is untrained. Besides, the system of apprenticeship has suffered a marked decline during the past half century, and it can seldom be revived for even the worthiest of causes.

But if the establishment of regional vocational schools for the blind is at best a development of the remote future, and if the apprenticeship system is not entirely feasible, what can be done to prepare the blind for commercial and industrial occupations?

There still remains the possibility of utilizing our regular vocational schools. Such schools are numerous. Virtually every large community has one or more. They are likely to become even more numerous as the needs of a steadily growing industrial society become increasingly felt. The extensiveness of their curriculums and the high degree of specialization among the schools themselves provide the pupil with ample opportunity for satisfactory selections in the light of his ability and circumstance. Their instructors are generally men and women of long experience, capable of offering practical suggestions of all kinds. Such suggestions would be of inestimable value to the blind. They would easily determine the difference between success and failure in an occupation.

Moreover, in a vocational school a blind person would stand shoulder to shoulder with the sighted. He would no longer move about in the sheltered atmosphere of paternalistic institutional life until graduation dashes him upon the cold rocks of reality. Instead, he would have the opportunity to adjust himself to the workaday world slowly and therefore with less difficulty. Most important of all, he would not only be receiving vocational training in those occupations which hold the greatest probable success, but he would be simultaneously educating those about him and the community in general as to the potentialities of the blind. And this is extremely important, for these very same fellow trainees in many instances would be instrumental in his getting a position.

Still, can a blind person attend an ordinary vocational school profitably?

This question was recently submitted to the principals of the vocational high schools in New York City. Of the 16 who responded, 12 went on record with a categorical, "No." Two were of the opinion that the blind could profit from such schools, but only after reorganization of curriculums and the establishment of special courses. Another went a step farther and stated that "provision should be made in vocational high schools to provide for this type of student."[12] Only one went so far as to declare emphatically, "They do, unquestionably."[13]

Can the Blind Profit From Vocational School Training?

Such a response is hardly encouraging. However, if the majority of vocational high school principals offer little hope to the blind, they can be readily forgiven. Their attention has probably never been called to this question. Blind children are seldom referred to vocational schools. For various reasons, these children are unusually shunted off into schools for the blind, where they tend to remain until graduation or withdrawal. Only 1 of the 16 vocational high schools mentioned above reported any such reference. Consequently, most principals of vocational schools have had no real occasion to consider the problem of the blind. Like the layman, they are likely to have no accurate knowledge as to what a blind person is capable of doing. In view of this, it is rather surprising and encouraging that as many as 4 of the 16 principals who replied to the question held positive viewpoints.

There is really little question that the blind can profit from most vocational high schools. Miss Grace Harper of the New York State Commission has reported the enrollment of several blind students in such schools. Many have also been enrolled in various private business colleges and schools of technology throughout the nation. On January 22 of this year Jessie A. Tritt and Frances Blend of the Los Angeles City schools reported 21 blind students in attendance at the Francis Polytechnic High School. "Blind persons," they believe, "could attend all such schools."

A specific example of a visually handicapped youth having been enrolled in a vocational high school has been made available by John F. Bledsoe, superintendent of the Maryland School for the Blind. In a communication dated December 5, 1940, Mr. Bledsoe wrote:

> Replying to your letter in regard to special training in vocational and industrial trade schools by one of our students, I beg to say that we sent one student who had shown a good deal of talent in the repair of radios to the Public Vocational School in Baltimore. He went to the school and accomplished in three years what ordinarily takes seeing boys four years to accomplish.
>
> He is now living at Federalsbourg, Maryland, and is engaged in the repair of radios. Apparently he is quite an expert although totally blind. His name is Maurice Mowbray.

What Maurice has accomplished in the field of radio repair, Tom, Dick, and Mary can duplicate in other fields. True, they may not always be able to follow in exact detail the requirements set forth by a particular vocational school. And they may even fall short of graduation. Yet even without diploma, the fact of their attendance at such a school plus the training they received would enhance their chances of occupational success considerably.

But what are some other fields besides radio repair suited to the blind? This is not an easy question. Much depends upon the individual concerned, organization of the vocational schools, and the philosophies and attitudes of the school authorities. It is a question that can be tentatively answered in a general way, however, by analyzing the courses offered in a school in the light of an occupational survey. Thus, by taking a course of study issued by the Department of Vocational Education in New York City and placing it in a juxtaposition to, let us say, the list of occupations compiled by the American Foundation for the blind, the following suitable fields suggest themselves:

Course	*School*
Auto Mechanics	ACDFHIPQ*
Clerical	K
Electrical Maintenance	AMQ
General Commercial	ADEHKNOUX
General Industrial	DQSVNO

[11] Frampton, M. E., and Rowell, H. G., *Education of the Handicapped*, Vol. 11, p. 153.

[12] Joseph, Daniel B., Principal of the Jamaica Vocational High School, New York City.

[13] Farnsworth, Edna A., Principal of Brooklyn High School for Homemaking, New York City.

Course	*School*
Home Nursing	ENVX
Household Arts	FMNWX
Leather Goods Mfg.	P
Machine Shop	ADFMPQSVWX
Merchandising of Foodstuffs.	U
Merchandising and Sales	K
Radio Mechanics	DMQSVW
Secretarial (Post Grad.)	K
Shoe Repairing	DS
Stenography and Typing	K

TABLE III. Occupational Fields Suitable for the Blind

It would be seen from this that blind boys and girls could profitably attend eighteen of New York's 24 vocational high schools. They could enroll in at least 15 major fields. With the aid of rehabilitation workers or special supervisors, both the number of schools and courses could undoubtedly be increased to include others not mentioned here. For that matter, such aid should be forthcoming in whatever form or degree necessary until satisfactory adjustments have been made by the student and proper pupil-pupil and pupil-teacher relationships established. A certain amount of reorganization in curriculum and administration would probably be essential in most cases. However that may be, no school should close its doors to the blind without conclusive proof that nothing can be done to assist these persons, for in a democratic society it is the duty of every school administrator to adapt his institution to the needs of the community and to the needs of each and every individual in that community.

Thus certain basic facts stand out clearly. As this study has shown, employment possibilities for those with severe visual handicaps are fairly numerous. The blind, contrary to popular opinion, are not doomed to charity or mendicancy. Many of them are capable of earning a self-respecting livelihood in virtually every economic activity. What is more, the number capable of doing so is not 1 per cent but 10 or 15 times that figure.

These employment possibilities are found mainly in agriculture, commerce, industry, and the professions. Of these, the commercial and industrial occupations are the most promising, accounting for approximately 64.6 per cent of all employed blind persons.

It was further shown that only a small proportion of the blind have been specifically trained for such occupations. In California, for example, less than one eighth of those employed in commerce and industry had been fully prepared in advance of their employment. That such previous preparation is both desirable and essential goes without saying. The question is, therefore, how this type of vocational training can best be provided.

Several suggestions follow. One of these entails the establishment of regional vocational schools for the blind. Another offers the possibility of a revived apprenticeship system, while a third looks toward the wider use of our regular vocational high schools.

Of these suggestions, the one calling for a more extensive use of vocational schools appears most encouraging. Certainly it is the most feasible plan of those suggested. Some schools, it will be recalled, have already demonstrated the practicability of training blind persons for commercial and industrial occupations, and there is no good reason why their number should not be increased. That their number will increase is quite certain, for educators the country over are steadily coming to recognize the fact that public schools should function in the interest of all children, exceptional as well as normal.

One thing should be kept in mind, however. The plan to provide occupational training for the blind by the utilization of vocational high schools is not to be regarded as a panacea. This problem of unemployment is far too complex to engender confidence in any one approach to its solution. A thorough vocational training in itself is no guarantee of success, nevertheless it does play a very important part. Since it does, every effort should be made in this direction. So, if interest has been aroused among even a few vocational school principals, superintendents of schools for the blind, rehabilitation specialists and other interested individuals, and if even a small amount of experimentation will grow out of this interest, then the cardinal aim of this study will have become realized.

*The letters represent the following schools: A — Bronx Vocational High School for Boys; C — Samuel Gompers Vocational High School; D — Brooklyn High School for Specialty Trades; E — Brooklyn High School for Homemaking; F — Brooklyn High School for Metal Trades; H — East New York Vocational High School; I — Brooklyn High School of Automotive Trades; K — Central Commercial High School; M — Metropolitan Vocational High School; N — Yorkville High School of Women's Service Trades; O — Manhattan High School of Women's Garment Trades; P — Murray Hill High School of Building and Metal Trades; Q — New York Vocational High School for Boys; S — Chelsea Vocational High School; U — Food Trades Vocational High School; W — Jamaica Vocational High School; V — Queens Vocational High School; X — McKee Vocational High School.

In-Service Instructor Training for War Production

JOHN R. PATLOW*

(Continued from page 147 of the April, 1942, issue)

e) If the small end bears, set the tailstock forward or toward the operator.

f) Repeat Operations *c*, *d*, and *e* until the taper is cut correctly.

Caution: Do not drop the gauge quickly on the taper because it will be difficult to turn the gauge.

g) Polish and correct any slight variations with a file.

INFORMATION UNIT NO. 25

Machine-Shop Technology — Prepared by Wm. N. Lathrop, Counselor

Grinding Clearance on Machine Cutting Tools

Objectives:

1. To learn the correct side clearance, front clearance, side rake, and back rake angles for grinding tool bits.

2. To become familiar with the equipment for grinding and sharpening tool bits and drills.

3. To become familiar with the various steps in grinding a tool bit.

4. To become familiar with the various shapes and uses of tool bits.

General Information: The tool bit is that part of the lathe, shaper, or planer tool which cuts the metal that must be removed to bring the work to the desired size and shape.

Tool bits are made of many kinds of carbon steel. The carbon content used by a manufacturer of the steel, plus the actual secret process of manufacturing this steel, is denoted by trade names with a few of which we shall become familiar in our machine-shop work. Tool bits are usually made of high speed steel, a few trade names of which are "Clarite," "Monax," and "Rex AAA." High speed or high carbon steel is much preferred as a cutter to the low carbon steel cutter because the actual cutting speed of high-speed steel is approximately twice that of the low-carbon steel. The development of this high-speed steel tool bit has, thus, more than doubled production.

The cutting tool is one of the most important things to consider in the machining of metal. In order to machine metal accurately and efficiently, it is important that the cutter or tool bit have a keen cutting edge, ground with the correct clearance, rake, etc., for the particular kind of metal being machined, and that the tool bit be set in the proper relationship to the work. The successful operation of a lathe, shaper, or planer turning out work of good quality, depends to a great extent on the skill of the operator in grinding his tools.

All cutting tools should be ground with a wet grinder or grinding wheel, or if ground dry, they should be frequently dipped in water to prevent annealing of the cutting edge.

Four angles are important in grinding tools.

*Vice-Principal, Milwaukee Vocational School, Milwaukee, Wis.

These angles, shown in Figure 1, are the rake angles, top and side, and the clearance angles, front and side. These angles vary with the material being machined.

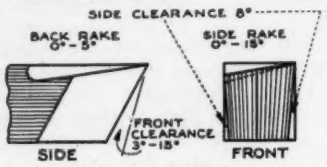


Fig. 1. Tool bit Showing four grinding angles

The top rake of a lathe tool bit is usually provided for in the toolholder by setting the tool on an angle. This angle is usually from 15 to 20 deg. These rake angles are correct for the machining of cast iron and steel, but on forged

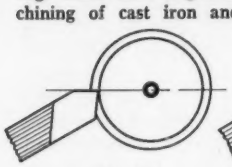


Fig. 2

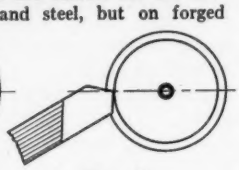


Fig. 3

Correct positions of cutting tools

tools it is necessary to grind this top rake in the tool. This top rake can be varied somewhat by adjusting the tool in the tool post through the rocker. The softer the material the less the top rake should be. There should be no top rake for turning bronze, and the cutting edge of the tool should be about horizontal. See Figure 2. A negative rake, Figure 3, is often used for turning soft copper and babbitt.

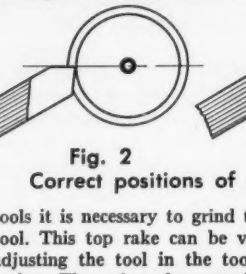


Fig. 4

Fig. 5

Fig. 4. Tool ground without front clearance

Fig. 5. Proper position of boring tool

The angle of the side rake varies with the material being machined. The proper angle is from 6 deg. for soft material to about 15 deg. for steel.

A tool is ground with side clearance to take care of the feed advance and to prevent the tool from dragging on the shoulder formed by the cut. This angle is about 8 deg. from the vertical and is constant.

The front clearance of a tool depends somewhat on the diameter of the work to be turned. If a tool were ground square, without any front clearance, it would not cut, as the material being turned would rub on the cutting tool just below the cutting edge. See Figure 4. The front clearance is necessary to eliminate this interference. This clearance, which should be less for small diameters than for large diameters, may range from 3 deg. to 15 deg. Do not grind more front clearance than is necessary, as this takes away the support from the cutting edge of the tool. Do not grind the tool bit while in the toolholder.

After a tool bit has been ground on a grinding wheel, it will produce better work and last longer if the cutting edge is stoned with an oilstone. This takes away the wheel marks and gives a smooth cutting edge. The cutting edge of a tool must be set on the center line of the work. In grinding boring tools, see that the front clearance is sufficient to prevent the tool from rubbing in the hole and dragging at the bottom. See Figure 5.

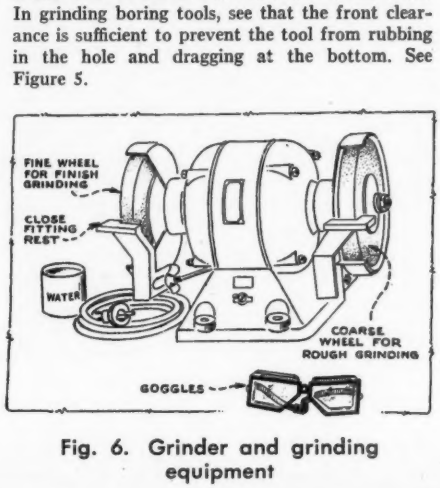


Fig. 6. Grinder and grinding equipment

Good grinding equipment is essential for satisfactory grinding of lathe tool bits. The illustration below shows a good type of grinder for this class of work. The grinder is motor driven, has two grinding wheels, one for rough grinding and the other for finish grinding the tool bits.

The peripheral speed of the grinding wheel is approximately 5000 f.p.m. The grinding wheels are enclosed in close-fitting guards, and the tool rests are adjustable and convenient. The operator should wear goggles while grinding if the grinder is not equipped with glass spark shields. The grinding wheels should be balanced so that they will run smoothly, and the wheels should be frequently dressed to keep them true. The water pot at the left of the grinder, in the illustration, should be filled with water in which the tool bit may be cooled when it becomes heated from grinding. A good oilstone should be used after grinding. The cutting edge of the tool bit should be honed to improve the cutting quality of the tool, to produce a better finish on the work, and the cutting edge of the tool will stand up much longer than if it is not honed.

Grinding a Roundnosed Turning Tool for General Machine Work

Operation Steps

Be careful not to get the tool too hot. Dip the tool bit in cold water occasionally to avoid burning.

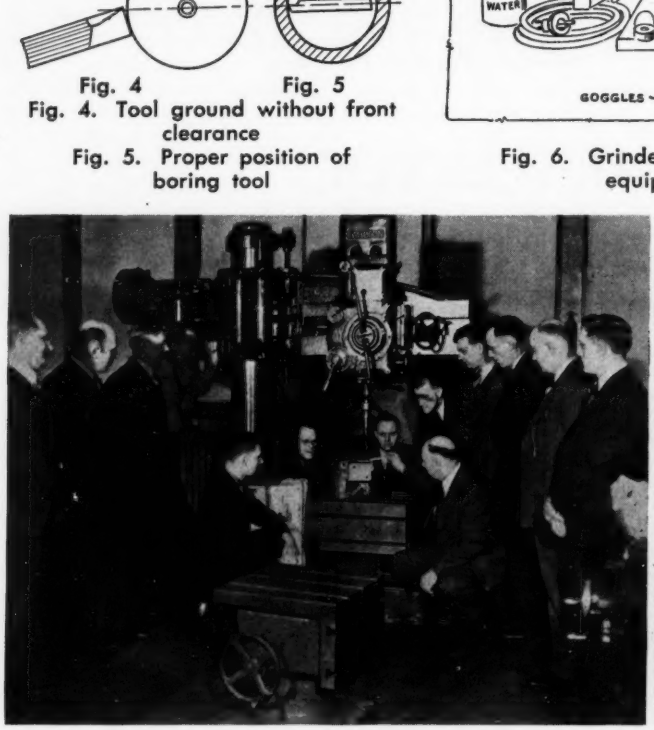
1. Don't grind carelessly. Know where and how and why to take off the metal.
2. Don't hold the tool as if your fingers were paralyzed; hold it securely enough to control it.
3. Don't hold the tool bit in one place on the wheel or you will cut a groove in the wheel.
4. Wear your goggles.

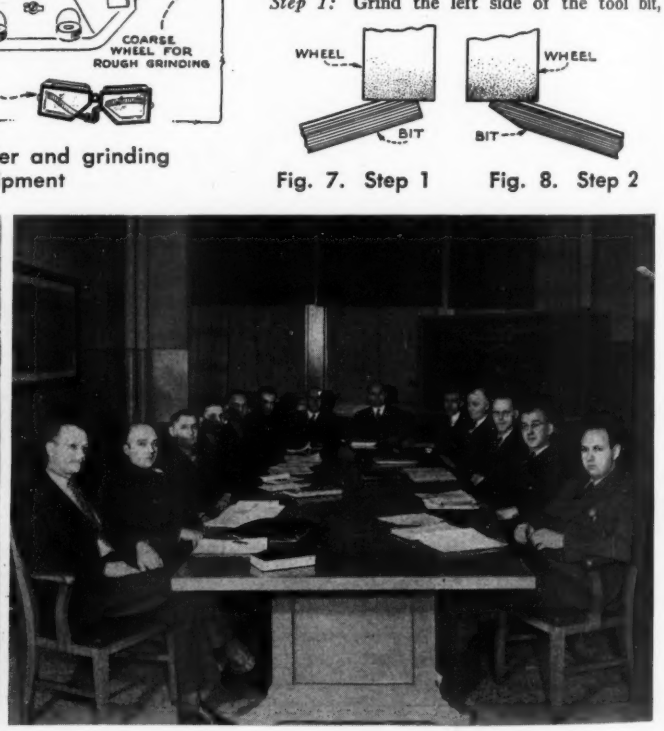
The following illustrations show the various steps in the grinding of a roundnosed turning tool for general machine work.

Step 1: Grind the left side of the tool bit,

Fig. 7. Step 1

Fig. 8. Step 2





Instructor — training demonstration and conference classes. In the conference class from left to right: Leslie Miller, Bernard Latzel, Albert J. Lauterbach, C. M. Brooks, Lyle Brooks, John T. Resch, James T. Abbott, supervisor; John R. Patlow, supervisor of instructor training; Hugh A. Lackey, Russell L. Garrison, Reuben Shefloe, Frank A. Sperner, and James H. Moll

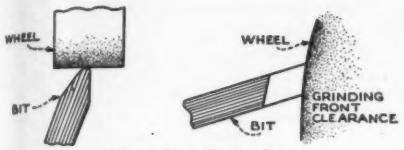


Fig. 9 — Step 3

holding the bit at the correct angle against the wheel to form the side clearance. Use a coarse grinding wheel to remove most of the metal, then finish on a fine grinding wheel to produce a straight surface. Dip the tool bit into water frequently while grinding to prevent overheating.

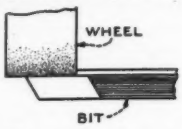


Fig. 10 — Step 4

Step 2: Grind the right side of the tool bit, holding it at the required angle to form the right side. This angle is not so important as it has very little to do with the cutting edge of the tool. However, too much of the bit should not be removed, as the more metal left on the bit the better. It absorbs the heat and also adds to the physical strength of the tool bit.

Step 3: Grind the radius or rounding on the end of the tool bit. A small radius, approximately 1/32 in. is preferable, as a large radius may cause chatter. Hold the tool bit lightly against the edge of the wheel and turn from side to side to produce the desired radius. Be careful to hold the tool bit at the correct angle to obtain the proper front clearance.

Step 4: Grind the top of the tool bit, holding the bit at the required angle to obtain the necessary side rake and back rake.

Step 5: Hone the cutting edge all around and on top with an oilstone until the cutting edge is very keen. The tool bit will cut better and will last longer than if it is used without honing.

Correct Height of the Cutting Edge

Straight Turning

The cutting edge of the tool bit should be about 5 deg. above center, or 3/64 in. per inch in diameter of the work for ordinary straight turning.

The cutting edge of the tool bit should always be placed exactly on center for all types of taper turning and boring and for cutting screw threads; also for turning brass, copper, and other tenacious metals.

The following is an illustrated list of high-speed lathe tool bits showing their shapes and

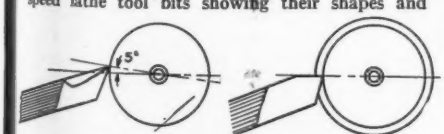


Fig. 11 Fig. 12

Fig. 11. Correct height of cutting edge — cast iron, steel, etc.

Fig. 12. Correct height of cutting edge — brass, bronze, etc.

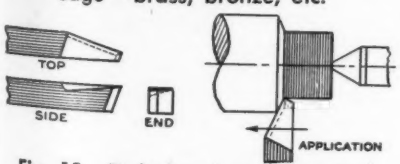


Fig. 13. Right-hand roughing tool

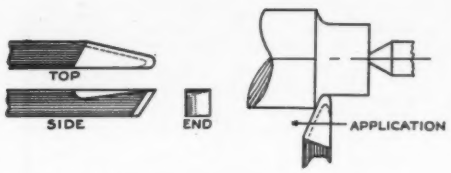


Fig. 14. Round-nose finishing tool

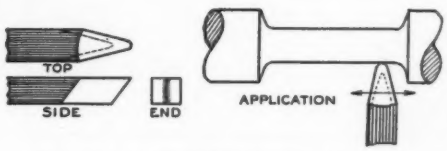


Fig. 15. Round-nose turning tool

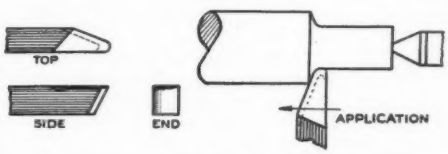


Fig. 16. Right-hand turning tool

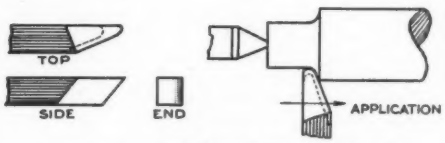


Fig. 17. Left-hand turning tool

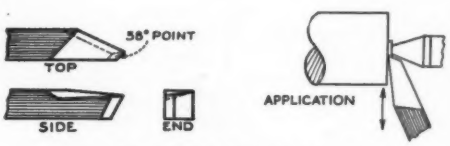


Fig. 18. Right-hand side tool

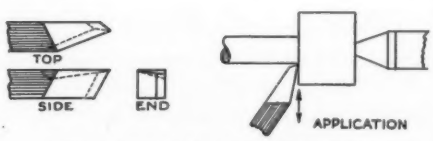


Fig. 19. Left-hand side tool

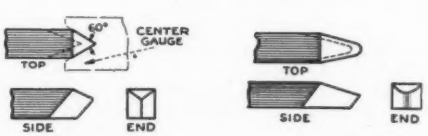


Fig. 20 Fig. 21

Fig. 20. Screw-thread cutting tool. (See Fig. 2 for application)

Fig. 21. Brass turning tool

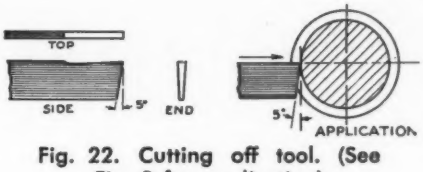


Fig. 22. Cutting off tool. (See Fig. 2 for application)

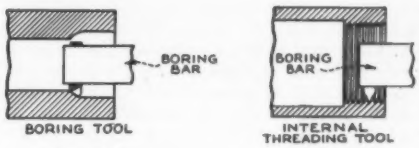


Fig. 23 Fig. 24

Figs. 23 and 24. Boring and inside threading tool. (See Fig. 5 for application)

their application to the job to produce the desired results for which they were ground.

Stellite tool bits are used in manufacturing plants where mass production is necessary because they will stand higher cutting speeds than high-speed bits.

On account of the extreme hardness of stellite, this metal is more brittle than high-speed steel, and for this reason should not have quite as much clearance, side, and back rake. There should be just enough clearance to permit the tool to cut freely, as the cutting edge must be well supported to prevent chipping and breaking. Because of the tendency of this type of bit to chip and break on the cutting edge, it is limited to certain types of work and is not as widely used for general machine work as high-speed bits.

Tungsten carbide tipped bits are used for manufacturing operations where maximum cutting speeds are desired, also for machining hard or abrasive materials. Tungsten carbide is so hard and brittle that it is not practical to use it alone, so a small tip is brazed onto the point of a carbon steel bit or shank.

Tungsten carbide tipped tool bits must be ground on a special grade of grinding wheel, as they are so hard that they cannot be satisfactorily ground on the ordinary wheel. Just enough clearance should be ground on the cutting edge to permit the tool to enter the cut freely. If too much clearance has been ground, the cutting edge will not be properly supported and will chip and break away.

After grinding, the cutting edge of the tungsten carbide tipped bit should be finished by lapping on a cast iron disk charged with diamond dust.

Forged carbon steel lathe tools are ground much the same as high-speed bits, but care must be exercised not to overheat the tool while grinding and thus draw the temper.

One advantage of a forged carbon steel lathe tool is that it absorbs the heat better and is somewhat more solid than the patent tool-bit holder which has the inserted-type bit. However, the carbon steel lathe tool has been almost entirely replaced by the high-speed bit.

INFORMATION UNIT NO. 26

Machine-Shop Technology — Prepared by Wm. N. Lathrop, Counselor

Cutting Speeds of Various Metals

Objectives:

1. To become familiar with the cutting speeds of the various ferrous and nonferrous metals which are most often encountered in the machine shop.

2. To tabulate these cutting speeds into a simple, readily available chart which may be used as a standard reference.

3. To learn the meanings of the words *speeds* and *feeds* when applied to machine-tool work.

General Information: Speed appeals to every individual. No matter in what form it is found — whether it be the automobile, the airplane, or the individual, speed holds our attention.

In the industries the fascination of speed is

ever present in the race for production and production methods.

In the use of machine tools, maximum cutting speeds and rates of feeds are rapidly increasing.

Cutting speed is a term used to express the velocity of the cutting tool over the surface of the work. It is expressed in feet per minute. If, when planing a piece of work 8 ft. long, it took one minute for the tool to travel the length of the piece, the tool would have a velocity or cutting speed of 8 f.p.m. If the tool had traveled the length of the piece in one-half minute, the cutting speed would have been increased 16 ft. per minute. If, in lathe work, a shaft 4 in. in diameter were being turned, and the shaft made 1 r.p.m., the cutting speed would be about 1 f.p.m. (the approximate circumference of the work). If the work were but 1 in. in diameter and made but 1 r.p.m., the cutting speed would be about 3 in. or ¼ f.p.m. However, if the speed of the piece that is 1 in. in diameter should be increased from 1 to 200 r.p.m., then the cutting speed would be increased to a velocity of 50 f.p.m.

In lathe work, cutting speed increases directly as the speed of revolutions when the diameter is constant, or, if speed of revolutions is constant, then cutting speed increases directly as the diameter increases.

There is a maximum limit to cutting speed which cannot be exceeded without disastrous results. If this limit is exceeded, the tool quickly dulls and ceases to cut.

The chief factors which govern maximum safe cutting speed are:

1. The kind of material used in making the tool, that is, whether it is carbon steel, high-speed steel, stellite, or cemented carbide.

2. The kind of material being cut, whether it is cast iron, steel, brass, bronze, or aluminum.

3. The degree of hardness of the metal being cut, as may be found in soft cast iron, hard or chilled casting, chrome-nickel steel, manganese steel, or soft machinery steel.

4. The depth of the cut and the rate of the feed used, whether they are *heavy roughing cuts* or *light finishing cuts*.

There are other factors that affect cutting speed such as rigidity of the work, rigidity of the machine, method of holding the work, etc., but the factors enumerated are of the greatest importance.

Tools of high-speed steel, stellite, or cemented carbide will cut at a higher rate of cutting speed than tools made of carbon steel. Soft gray iron castings may be cut at higher speeds than hard castings. Brass and aluminum may be cut at much higher speeds than either iron or steel. Light finishing cuts may be faster than heavy roughing cuts.

The following table gives safe average cutting speeds that may be used for ordinary work under normal conditions. When cutting oils or coolants are used, all the cutting speeds indicated in the table may be increased, except in the case of cemented carbide tools which are best used without a coolant.

Material	Carbon	High Speed	Stellite	Cemented Carbide
Cast Iron Soft	40	75	120	250
Cast Iron Hard		30	75	175
Cast Iron Chilled			50	150
Malleable Iron	40	75	125	250
Soft Steel	40	80	140	200
Hard Steel	15	30	40	100
Brass or Copper	80	175	250	450
Bronze	40	75	120	300
Aluminum	300	600	1000	1500

Cutting speeds in ft. per minute

Feed, in machine toolwork, relates to the side or end movement of the tool. It may be expressed in inches or fractional parts thereof, such as 1/16 in. feed, ¼ in. feed, etc. In planer work if a feed of 1/16 in. per stroke is used, it will take 16 strokes to plane an inch in width. This rate of feed is also expressed as a feed of 16.

In lathe work, the feed or side movement of the tool per revolution of the work may be 1/75 in. Seventy-five turns of the work will be necessary to finish 1 in. in length. This rate of feed is usually expressed as a feed of 75.

In drilling holes, the feed usually expresses the depth of penetration per revolution of the drill, as a feed of 0.012 in.

The feed of milling machines is usually expressed by the amount of table movement in inches per minute under the cutter.

The proper feed to use depends upon many factors, such as the kind of material being cut, whether roughing or finishing cuts are being made, the power of the machine, and the rigidity of the tool and the work. The usual tendency of the beginning machine operator, in selecting the feed which depends upon so many different factors, is to underestimate the capabilities of the machine for handling work. Don't overload the machine but at the same time don't *underload* it. Make it live up to the specifications to which it was designed.

The modern science of *time study* is nothing more than a science based upon the combination of the knowledge of speeds and feeds. By having a knowledge of speeds and feeds it is a simple arithmetical process to compute the time required to finish a piece. It is to this science of time study that modern industry owes its *piece* and *premium* work systems of remuneration. Through these systems the workman has an opportunity, in a limited way, of exerting his individualism on the job.

ASSIGNMENT UNIT NO. 25

Machine-Shop Technology — Prepared by Wm. N. Lathrop, Counselor

Grinding Clearance on Machine Cutting Tools

Objectives:

1. To review the information gained concerning the correct rake and clearance angles for tool bits.

2. To review the various steps in the grinding of a tool bit.

3. To become more familiar with the various shapes and uses of tool bits.

Assignment:

1. Read Information Unit No. 25 on Grinding Clearance on Machine Cutting Tools.

2. Answer all questions listed below according to the directions given.

3. Have the assignment checked by the instructor.

Questions:

1. What is a tool bit?

2. What is a high-speed tool bit? Compare its use to that of a carbon steel bit.

3. In order to machine metal accurately and efficiently, what two important facts must be borne in mind?

4. Why does it become necessary to cool the tool bit in water when grinding?

5. Illustrate the four angles which are of importance in the grinding of any tool bit.

6. When is a negative rake tool bit used?

7. After a tool bit has been ground on a wheel, what operation step is next necessary?

8. Briefly state the steps followed in the grinding of a right-hand roughing tool for steel. Illustrate if necessary.

9. Draw an illustration showing the shape and position of the tool bit relative to the axis of rotation while cutting screw threads or turning a taper.

10. Draw an illustration of a roundnosed finishing tool, explaining how it works.

11. Draw a diagram of a tool bit showing its application to the work when rough turning a machine steel shaft.

12. Do you favor the use of stellite and cemented carbide tool bits in modern production? Explain fully the stand you take.

ASSIGNMENT TEST NO. 25

Machine-Shop Technology — Prepared by Allan Bartelt, Instructor

Grinding Clearance on Machine Cutting Tools

Instructions: At the left of each statement mark an *X* through the letter (or letters) corresponding to the correct answer.

Test:

a b c 1. For ordinary straight turning, the tool bit should be placed (*a*) exactly on center, (*b*) below center, (*c*) about 5 deg. above center.

a b 2. A left-hand turning tool cuts to the (*a*) right, (*b*) left.

a b 3. The top of a lathe tool has a (*a*) double slope, (*b*) single angle.

a b c 4. Brass is often cut with a lathe tool having (*a*) no top rake, (*b*) negative rake, (*c*) 15-deg. rake angle.

a b c 5. The diameter of the job determines somewhat the (*a*) side clearance, (*b*) front clearance, (*c*) side rake.

a b 6. Front clearance is (*a*) greater, (*b*) less for small diameter jobs than for large diameters.

a b c 7. Tools are wet ground to (*a*) wash away ground metal, (*b*) prevent annealing, (*c*) grind more slowly.

a b c 8. When dry grinding a steel tool bit it should (*a*) never be dipped in water, (*b*) be dipped in oil, (*c*) be dipped in water.

a b c d 9. The cutting edge of the tool bit should be exactly on center for (*a*) taper turning, (*b*) straight turning, (*c*) thread cutting, (*d*) turning brass.

a b c d 10. Side clearance on a tool bit (*a*) depends on the diameter of the job, (*b*) is an 8-deg. angle, (*c*) takes care of feed advance, (*d*) prevents shoulder drag.

a b c d 11. The top of the tool carries the (*a*) back rake, (*b*) side rake, (*c*) end clearance, (*d*) side clearance.

a b c d 12. Tungsten carbide tools are (*a*) forged tools, (*b*) carbide tipped, (*c*) ground with large clearance, (*d*) ground with minimum clearance.

a b c 13. The cutting speed of high speed steel tools compared with high carbon steel tools is (*a*) less, (*b*) equal, (*c*) greater.

100 minus 2½ times ..... equals ..... per cent. No. Wrong Grade

ASSIGNMENT UNIT NO. 26

Machine-Shop Technology — Prepared by Wm. N. Lathrop, Counselor

Cutting Speeds of Various Metals

Objectives:

1. To review the information gained concerning the cutting speed of various ferrous and nonferrous metals.
2. To gain a clearer understanding of the meaning of the words — *cutting speeds* and *feeds*, as applied to machine-shop practice.

Assignment:

1. Read Information Unit No. 26 on Cutting Speeds of Various Metals.
2. Answer all questions listed below according to the instructions given.
3. Have the assignment checked by the instructor.

Questions for Discussion:

1. Why does speed appeal to nearly every individual?
2. Define the term *cutting speed.*
3. Why does a lathe tool *burn up?*
4. What are the four chief factors which govern the maximum safe cutting speed?
5. What is a safe average cutting speed that may be used for turning soft steel when making roughing cuts and using high speed tool bits? When turning cast iron? When turning brass?
6. What may one expect to happen when the maximum limit of cutting speed is exceeded? Explain fully.
7. How does the velocity of cut of carbon steel tools compare with that of high-speed steel tools?
8. How does the cutting speed of stellite compare with that of high-speed steel?
9. How does a tungsten carbide tool compare with a high-speed steel tool in hardness? In brittleness? In retaining its hardness at high temperatures?
10. Should tools of stellite and tungsten carbide be set for lathe work to have as much clearance as tools made of high-speed steel. Why?
11. Find the number of revolutions per minute necessary when turning a steel shaft 2 in. in diameter to obtain a cutting speed of 85 f.p.m.?
12. A steel shaft ¾ in. in diameter is turning 150 r.p.m. What is the cutting speed of the tool?
13. What is meant by the term *feed* as applied to machine-shop practice?
14. How is feed expressed?
15. What does the expression 1/16 in. feed mean?
16. How is the feed of a drill press usually expressed?
17. Would you, as a grade A machinist, employed in industry, be willing to receive your remuneration on a *straight time* basis, a *piece-work* basis, or on a *premium-work* basis? Why?
18. A cast-iron flywheel 8 ft. in diameter, 24-in. face, is to be turned with one roughing cut using a high-speed tool bit. If a feed of 1/16 in. is used, how much time will be required to make this cut?

ASSIGNMENT TEST NO. 26

Machine-Shop Technology — Prepared by Allan Bartelt, Instructor

Cutting Threads

Instructions: At the left of each statement, mark an *X* through the letter or (letters) corresponding to the correct answer.

Test:

a b c 1. Cutting speed is expressed in (*a*) revolutions per minute, (*b*) feet per minute, (*c*) inches per revolution.

a b c d 2. For the same cutting speed as on a piece 10 in. in diameter, a 2 in. in diameter piece will have to make (*a*) the same r.p.m., (*b*) 5 times as many r.p.m., (*c*) 20 times as many r.p.m., (*d*) 1/5 as many r.p.m.

a b c 3. The approximate cutting speed when turning soft steel with high-speed steel tool bits is (*a*) 80, (*b*) 30, (*c*) 175.

a b c 4. The cutting speed of stellite compared with that of high-speed steel tools is (*a*) ½ as great, (*b*) twice as great, (*c*) 3 times as great.

a b c d 5. Tungsten carbide compared with high-speed steel (*a*) is more brittle, (*b*) cannot withstand high temperatures, (*c*) cuts at greater speeds, (*d*) is used without coolant.

a b c d 6. The cutting speed of tungsten carbide compared with high-speed steel is (*a*) 2 times as great, (*b*) 3 times as great, (*c*) 6 times as great, (*d*) equal.

a b c d 7. On a lathe, feed is expressed in (*a*) feet per minute, (*b*) inches per revolution, (*c*) revolutions per inch of tool movement, (*d*) inches per minute.

a b c d 8. A 10-in. cut on a lathe with a feed of 32 would require for one complete cut (*a*) 32 revolutions, (*b*) 10 revolutions, (*c*) 320 revolutions, (*d*) 3.2 revolutions.

a b c 9. Cutting speed is equal to (*a*) r.p.m. times D/4, (*b*) r.p.m. times circumference, (*c*) r.p.m. divided by D/4.

a b c d 10. The approximate r.p.m. necessary when turning a steel shaft 4 in. in diameter with a cutting speed of 85 is (*a*) 340 r.p.m., (*b*) 85 r.p.m., (*c*) 21 r.p.m., (*d*) 170 r.p.m.

a b c d 11. A feed of 1/16 in. on a lathe means (*a*) revolutions per inch of tool travel, (*b*) 1/16 in. tool travel per revolution, (*c*) 16 r.p.m., (*d*) 1/16 in. depth of cut.

100 minus 2½ times ..... equals ....., per cent. No. Wrong Grade

Accent on Safety

EDWARD W. STLUKA*

In these hectic days, everything is "all out" for defense production. Factories, some of which have been idle for years, are working on 24-hour a day schedules, turning out materials vital for the survival of the United Nations. But, to turn out these materials, the factories need skilled hands and more skilled hands. Therefore, vocational schools and other training agencies, such as the National Youth Administration for Wisconsin, have likewise gone on a long-hour schedule turning out their products — skilled hands for industry.

Under these circumstances, days, hours, and even minutes are precious. Safety practices are paramount. An accident brought on by carelessness may do more harm than a time bomb planted by a saboteur. An accident resulting in the loss of man hours and loss of production can be far more destructive than a ton of emery dust "salted" over the machines.

Realizing these things, John Faville, Jr., Wisconsin's NYA administrator, late last winter sent an urgent message to every NYA supervisor in the state. The message read as follows: "Safety should be and must be an integral part of every young person's work experience. The development of safety habits and the use of safety devices by NYA workers cannot be stressed too strongly. It is important to national defense that these young people, when they take their places in private industry, *be as well versed in safety as in any other phase of work experience.*"

And, with these words, he launched an intense, state-wide NYA "safety conscious" campaign. The purpose of this campaign was threefold: (1) to promote safety education among NYA youth workers; (2) to make Wisconsin NYA projects the safest in the United States; and (3) to make this safety known to the public. Every project, no matter how small, was urged to take an active part in the campaign.

Not alone did the NYA state safety department plan and run the campaign but, because of the necessity of promotion, members of the NYA department of public information took a decided hand in affairs. Complete cooperation between the two departments existed from the first with each department having its definite duty in the campaign. The safety department analyzed safety operation on various projects, evaluated new and different *safety slants* submitted by NYA youth from all parts of the state, and kept tab of man hours worked continuously without accidents on all projects.

The department of public information kept score, sent out *pep* memorandums and instructions to the supervisors, and, in general, saw to it that the spark of enthusiasm kindled in the early stages of the campaign grew into a roaring, unquenchable blaze. To keep interest high, not only among the NYA supervisors and youth but also among the public, they encouraged

(Continued on page 200)

*Milwaukee, Wis.

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

John J. Metz, Editor

The School Shop and Vacation Time

Many industrial-arts teachers are taking a great interest in adapting their instructional procedures so as to include work which in some way or other can be utilized by the army, the navy, or for civilian defense. This type of work naturally arouses the students' interest and they are quite willing to exert special effort to do it well, thereby indirectly gaining greater knowledge about materials, and skill in handling tools.

In one of the larger cities of the Middle West, for instance, three of the high school industrial-arts teachers had asked their classes for volunteers to donate their services for one day of the spring vacation to work on the plane models which the school is making for the Navy Bureau of Aeronautics. Much to their surprise, the day set aside for the work saw 41 of their pupils at school ready to make good their promise. This is the more remarkable, as the work has to meet rigid standards of accuracy and workmanship. The boys, however, were anxious to do their bit in a civic-patriotic cause, hence, they gladly sacrificed an appreciable part of their vacation time.

This brings another thought to mind. The public is getting accustomed to seeing school shops running long hours. Time and again suggestions have been made to have school shops open for boys during the summer. Some cities have done this regularly for a number of years, but there are still many communities where this valuable method of keeping youthful energy directed into proper channels and young minds occupied with worth-while, character-building, and interest-arousing jobs, has not been introduced. It must not be forgotten that this would be one way of strengthening the mental and moral fibers which, we are told, have been allowed to grow weak in America's youth and manhood.

"Well — our school shops will be utilized for wartime defense training," some may retort. That is fine, but there are many school shops that are not equipped for this type of training. These could easily be opened for summer vacation shopwork.

Others may say "What will we do with the students during the vacation period? It is difficult enough to provide the materials needed for our shopwork during the regular school year."

The matter of materials and supplies will, no doubt, be a troublesome one. Shop teachers are an ingenious lot, however. They possess imagination, skill, and initiative. They have solved other troublesome problems, and the lack of regular materials and supplies must also be overcome.

There is still time to make a survey among the students of what repairs are needed in the various homes. There is the problem of repairing or rejuvenating furniture, a broken window or a door that does not function properly, a fence that needs a few pickets, a gate that is broken down, a sidewalk that is no longer safe — all of these and many more may be uncovered for that vacation activity under consideration. But, someone may retort "Most of our children are living in rented homes." A neighborhood, in which the houses and yards are kept clean and in repair, exerts a good influence especially upon the children who are living in it. Every effort made to get pupils to participate in making their neighborhood a better place to live in, therefore, is a step in the right direction.

Those boys who cannot get permission to effect needed repairs or improvements on their own rented houses may be interested to cooperate with others in doing repair or improvement work in the school shop or about the school grounds.

The question of materials and supplies is still not solved. What about that? The survey that will undoubtedly uncover numerous jobs that may be put on such a vacation program may also disclose sources of materials that may be useful on many of the jobs. Some of this material may be obtained from landlords, others may be donated by manufacturers and dealers. Even the few remaining wood boxes at the grocery store may be found helpful. In factory districts, crates from machinery and the like can frequently be obtained. Much of this wood may be of a poor grade, but it may serve well to make a repair which otherwise would be ignored until a broken-down part of a fence, or wall, or gate, would assume the semblance of useless rubbish.

Then, too, what about the victory garden? Youngsters need encouragement and supervision. Parents may be ill-prepared to give much help to their children in any of these neighborhood projects. The primary interest in undertakings of this kind must be centered on the children. It is through these that parents may probably be reached; in the meantime the children will learn something of self-help, cooperation, and civic pride.

Some of the jobs outlined would require that work be done outside of the school shop. A different technique would have to be worked out, therefore, if much of this work outlined were to be undertaken. The shop teacher would then become a construction supervisor who would travel from job to job, and a student foreman would have charge of the individual projects.

Lastly — how about the salary for a shop teacher who would undertake this type of vacation work? Each community could well afford to give such a man more than he could, under present conditions, earn by getting a job in industry. Such a teacher would be doing a piece of civic and patriotic work superior to working in a defense industry, because he would be implanting some of the things which our youth must necessarily acquire if they are to carry on American traditions in a truly American way.

The School Shop and the War

With the school year 1941–42 drawing to a close, many school executives are beginning to organize for the summer participation of their school shops in the wartime defense program.

This is very necessary, because in many instances the present enrollment of trainees in these courses may be increased by almost 50 per cent. It also means that a close checkup on tools and equipment must be made, to say nothing of the supplies that have to be provided if the training of workers for wartime industries is to go on with efficiency and dispatch.

In many cities, the wartime defense training was done only during the nighttime and mostly in the shops of trade schools and full-time and part-time vocational schools. During the summer, day classes for trainees under this program can be established not only in the schools in which the training has been

done up to now but many of the high school shops that will otherwise be idle during the summer can be put into service and in this way facilitate the training of more men for the industries that have to arm America against its foreign aggressors.

Planning for these conversions must be done right now if everything is to be ready when the regular school year closes, and if the wartime defense program is to be carried on in the efficient manner which has marked its progress up to now.

While many cities are already prepared to make this shift into school shops released by the classes that occupy them during the regular school year, there are numerous well-equipped school shops that still lie idle during the summer months. The all-out effort of preparing America for the war requires the utilization of every means at hand. By proper planning, the progress of the wartime training program, fine as it has been, may be considerably accelerated.

Health for Defense

The Westinghouse home-economics department has started what is probably the first Health for Defense club among the wives of the firm's employees. By means of a questionnaire the individual problems of the club members were first ascertained. In this way it was learned just how the wives of the workers had to prepare the foods; whether electricity, gas, coal, wood, or oil is used in preparing the meals; and whether a refrigerator and other household appliances are in the home.

This home-economics department also invites its members to come to the laboratory kitchen to learn how to cook and bake certain dishes under the supervision of the laboratory staff. A monthly menu guide also is issued to the members by the home-economics department.

While shop teachers may not, as a rule, have much influence in the home-economics department of their schools, nevertheless, the idea worked out by this industrial firm for its workers discloses interesting possibilities for the schools, and is well worth passing on to the proper authorities. It might even suggest a program for an excellent service which the home-economics department of the school could render to its community during the summer months.

THE FIRST LINE OF CIVILIAN DEFENSE

With the shortages of some food materials, and the substitutes that will have to be used for others, there will inevitably be waste, dissatisfaction, and improper use by many housekeepers, and education may obviate much of this, and keep America's health program up to a victory pitch.

Safe Driving

The Travelers' Insurance Co., Hartford, Conn., in its 1942 booklet on street and highway accident data, presents some startling figures which show that 1941 has shattered every accident record since the automobile has become a leading factor in American transportation.

According to the tabulation shown, there were 40,000 deaths and 1,488,000 injuries caused by faulty and reckless driving. Among those killed were 4200 between the ages of 1 to 14, and 214,280 in these age groups were injured. Fatal accidents were caused by 14,590 drivers under 24 years of age, and 474,360 drivers in this age group were involved in nonfatal accidents.

This shows that the victims of these traffic accidents, as well as those causing them, were school children or youths still near the school age. It would then seem that greater emphasis put on safe walking and driving habits in the school might well be looked upon as a means of reducing this frightful record of carnage.

High school courses in safe driving have been instituted in many cities, but there are still too many communities where nothing is done about preparing youth to drive the modern high-speed automobile with care and circumspection. Late in the year as it is, some effort should be made even now to incorporate some of this safety instruction into the curriculum. At any rate, it should not be overlooked, and to make sure, put it on the outline of instruction now.

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and evaluated news releases on safety throughout the state. Both departments assisted each other in the planning and running of the campaign.

The campaign itself took the form of eight contests within one. At that time, the state of Wisconsin was divided into eight NYA areas, each with a certain number of youth for its quota. Counties in each area competed against each other for the honor of being the most *safety conscious* in their respective areas. La Crosse County, which led all eight area winners in the number of points compiled, was given a special award as the most *safety conscious* NYA county in Wisconsin. All eight areas likewise competed against each other for the title of the *most safety conscious* NYA area. Points were given for new and original safety slants, near-perfect safety setups, man hours worked continuously without accidents, safety rallies, safety exhibits, news and feature articles on NYA safety, radio skits and talks on safety, and the number of posters entered from each county and area in the semi-independent NYA safety poster contest.

While heavy demerits were held out for counties and areas having projects where conditions were found to be dangerous to the youth workers and other heavy demerits for lack of interest in the campaign, the total number of demerit points did not exceed 75 throughout the entire campaign — this out of a total of 78,551 merit points totaled during the campaign!

Three bronze-faced walnut wood plaques were awarded to the *most safety conscious* area in the state, the *most safety conscious* county in the state, La Crosse County, and to the youth whose submitted safety poster was adjudged to be the best. Smaller plaques went to the winner counties in other NYA acreas and to the youth whose posters were judged to be the best in their respective areas. Honorary award pins went to NYA supervisors in *runner up* counties as well as to runners up in the poster contests. Arnold H. Mathisen, a 19-year-old Superior, Wis., youth won the grand state award with his submitted safety poster.

Results of the contest were far better than anticipated. The accident rate dropped from an average of 108 a month to 63. The Kaukauna defense production shop put in a total of 17,081 continuous man hours without so much as a gashed finger, and other projects were not far from a similar record. NYA supervisors, enthused and astounded at the way the NYA youth became *safety conscious*, enlarged their scope of activity to take in ex-NYA youth working in private industry. Newspapers throughout the state rallied to the support of the campaign and, during the 60 days of the campaign, contributed a total of 24 pages of news matter.

In addition two Milwaukee NYA youth collaborated on the production of a series of clever safety-verse cartoons. These cartoons, submitted to various Wisconsin newspaper editors, became a journalistic "hit." Fourteen key dailies and weeklies published them. They are still being used as *fillers* by other papers and an occasional request for a set of cartoon mats still arrives at the NYA state office.

In the poster contest, set up county by county and area by area like the safety campaign itself, only the youth were qualified to win prizes. NYA supervisors could submit posters but were not qualified to win a regular award. Over 600 posters were submitted and these were judged by an impartial committee of judges headed by E. I. Woodbury, Chicago, director of the poster division of the National Safety Council, and including Dr. B. C. Corbett, executive secretary of the Milwaukee safety commission, Bert C. Broude, chairman of the Milwaukee safety commission, and Clarence J. Muth, manager of the safety division of the Milwaukee Association of Commerce.

The judges expressed astonishment at both the number and excellence of the posters. "I don't remember having seen a better group of posters done by young people in this or any other group," commented Woodbury. "A great majority show thought and real interest in safety. The Wisconsin NYA is to be congratulated on an excellent job."

And that the judges were sincere in their praise is evidenced by the fact that Woodbury requested that the entire total of 600 posters be sent to his office at the National Safety Council in Chicago for possible "idea use" and distribution over the nation by the National Safety Council.

In addition to the National Safety Council, the *safety conscious* campaign drew praise from other sources such as the Milwaukee safety commission, the Upper Mississippi River Valley Safety Conference and various local safety organizations in towns and cities throughout Wisconsin. The La Crosse *Tribune* and *Leader Press*, in an editorial titled "NYA and Safety" commented: "Executives as well as young men and women associated with the National Youth Administration . . . are to be commended for their exhaustive efforts in instilling a safety consciousness in the minds of those associated with industrial and business life of the community. . . .

"By learning about safety and the elimination of hazards on jobs in industrial plants and elsewhere in the nation, as well as in their daily life as civilians on the streets and in homes, these youth are taking a decided step forward in the never-ending effort to reduce the great toll of human lives and suffering through carelessness annually.

"They have been learning the right way — through actual experience. They watch for the things of which they have been made aware while at their jobs on work experience projects.

"When they are fitted for jobs in industry, the operators of these plants will know they have dependable persons on their payrolls, men and women who will exercise the greatest care around moving machinery.

"The program is highly worth while, deserving of the community's praise and support."

The value of this *safety conscious* campaign has been recognized in other ways, too. Already keenly interested are NYA setups in other states, with the Kentucky NYA being the first to adopt a like program. The thought behind this entire story is, however, that, if the campaign is so highly successful with young people on the NYA, it might be made just as successful in vocational schools, other institutions of technical learning, and even in private industry. . . .

INDUSTRIAL-ARTS OBJECTIVES

1. To provide opportunities for the development of fundamental shop skills and appreciations which will serve as a basis for further vocational training and advancement.

2. To acquaint youth with conditions in industry both from the standpoint of the employer and the employee in order that they may appreciate and better understand their problems.

3. To familiarize students with the products of industry in order that they may be more intelligent consumers.

4. To provide opportunity for purposeful exploration and experimentation especially on the junior high school level in order that the boy may further discover his aptitudes and interests.

5. To develop intelligent followership as well as leadership through various shop activities including the shop personnel organization plan.

6. To promote proper habits of safety and health particularly as they relate to shop activites and conditions in industry.

7. To articulate industrial arts with mathematics, science, design, and other school subjects especially from the standpoint of application in order that it may be a vital part of the student's general education.

8. To provide opportunities for growth where the learning and the skills required are commensurate with the capacity of the student, and where he really experiences the satisfaction that comes from success and the completion of a worth-while task.

9. To provide opportunities for the development of desirable habits of thinking through learning, analysis, planning, application, and performance in the shop.

10. To help develop well-rounded out individuals capable of using their hands and their heads whether it be in the pursuit of wholesome leisure-time activities or in the more serious business of earning a living.

— *T. A. Hippaka*
Director Industrial Education
Iowa State College, Ames, Iowa

Creating Confidence

DEAN M. SCHWEICKHARD*

Unwavering Belief

These are days when every sinew the nation over is being strained to put every available machine into production for the preservation of a civilized way of life. With the use of existing machines more machines are produced in order that production of goods and supplies may be further multiplied. While the machine runs, production continues, but when it breaks down, production stops.

The machine, however, is but a link between human ingenuity on one hand and the fulfillment of human needs or ambitions on the other. If the human element breaks down anywhere along the line the machine becomes of little avail. Human inventiveness was necessary to create the machine and human skill is required to operate it, but all the way along there is the belief that something can be accomplished.

Just as every mechanical facility must be put to work at a time like this, so every American needs to be in command of every one of his own powers and to exert each one where it will be most effective. Like mechanical development also, human accomplishment reaches its highest degree of proficiency when accompanied by an unwavering belief that ultimate achievement is possible. This belief in man and his ability to do is known as *confidence* and it is the very essence of survival in all human affairs. It is the secret of success in business, in government, in schools, in churches, and in intimate personal relationships. Without it business enterprises collapse, nations decline, military encounters fail, and men and women are enervated.

Kinds of Confidence

To some the word *confidence* may carry an implication of bitterness or suspicion because of some unfortunate experience with false or misplaced confidence. The *confidence man* is one who plays upon the credulity of people only to take advantage of them, but this is merely another instance of the manner in which a useful or desirable quality may be abused and not a reason for discarding it as useless. Contrary to misplaced confidence, there are myriads of examples of well-deserved confidence which serve to strengthen human relationships rather than shatter them.

From the standpoint of the individual there are essentially three kinds of confidence. The first is confidence in myself, to think, to be, and to do that which I consider worth while. This is the force which spurs me on to put my native and acquired powers into action. Second, there is the confidence I have in other people, in their integrity, their honesty, their ability, their strength, and their judgment. Confidence in others is usually based upon observation, reputation, or credentials; is founded upon the principle that people will usually do as they have done; and presupposes that their acts are a reflection of their sense of values. Third, there is the confidence which others may have in me, and this it is which greatly molds my way of life depending upon: (1) my opinion of the other person; (2) whether his confidence in me is well founded or misplaced; and (3) whether it is strong or weak. Any of these factors may be either positive or negative, and may work in either direction.

The individual who recognizes the indispensable value of self-confidence may be one who possesses little of it, but who sets about to acquire it quickly when the realization for the need of it comes upon him. The result in such a case is likely to be false confidence which exhibits itself in undue bravado, and extravagant statements of unsubstantiated superiority. It usually arises from a sense of insecurity or inadequacy, and may be accompanied by scanty or faulty knowledge of the situation to be faced. The person who puts on a front of false confidence is like the frightened cat who arches her back and bushes her tail in an effort to appear ferocious. The enemy, the adversary, or the competitor may be intimidated temporarily but there are no results of permanent value within the individual himself.

Confidence for Victory

It is *true confidence* which carries through to victory and success, and the individual or the nation who would reach those goals must find the ways to create and acquire it in abundance. True confidence arises fundamentally from a sense of strength, power, or ability either within oneself or immediately available. The little child finds confidence in the nearness and the handclasp of mother or father; the athlete finds it in his muscles and vivid memory of repeated practice; the artisan's confidence comes from his proved skill; and the aviator derives confidence from the power he knows lies in his plane and his knowledge of how to control it.

The feeling of strength, so essential to true confidence, is greatly augmented by a sense of being right. The mere conviction that one is right goes a long way, but to have a background of proof for that conviction has an even more far-reaching effect. This means thorough preparation for the task to be undertaken whether it be cultivating a field, building a house, piloting a ship, or winning a war.

When confidence created from such fundamental sources exists in one individual it is likely to be engendered in those about him, especially if they are concerned with the same cause and seeking to accomplish the same or similar ends. Furthermore, it grows unbelievably in the individual himself and in the group with each added success. The winning team wins more easily as long as their confidence continues to spring from its original source.

The person in authority over others has a special duty in the matter of maintaining confidence. If he is to fulfill the full responsibility of his position and be most effective, he must have the confidence of his staff or force and when this breaks down deterioration sets in. Undeniable illustrations of this invariable truth are found in the relationship between a superintendent of schools and his staff; a principal and his teachers; a foreman and his men; an athletic captain and his team; a parent and his child; an elected board and the public; any public official and his constituency; and between a military officer and his force.

The leader needs to remember that confidence is established by demonstrated superiority in planning and thoroughness in execution. He must bear constantly in mind likewise that favorable recognition from superiors, co-workers, friends, and observers is a potent builder of confidence for the man at the bench or in the ranks. Similarly the leader's own confidence is strengthened by the support and approbation of his staff.

The expansion of these relationships serves to embrace our entire nation, and all the nations who are fighting to build and maintain confidence among peoples and races unshackled by the tyranny of dictators who have no confidence in each other and none in themselves except that which is false. They shall fall because of the sham from which all false confidence springs forth; and the true confidence which is conceived in humility, born in sincerity, and launched forth unitedly will be victorious.

EDUCATION FOR ECONOMIC EFFICIENCY

The educated person takes pride in good work. He learns of the kinds of work offered by the modern world. He studies carefully what he would like to do. He checks his own ability and qualifications. He selects his lifework wisely and succeeds in it. He understands how his work is of value to society. He manages his income wisely through careful planning. He is a skillful and careful buyer, interested in consumer problems. — *Courtesy of the Wisconsin Industrial Arts Association.*

*Assistant Superintendent of Schools, Minneapolis, Minn.

Teaching Salesmanship to Students of Printing

DONALD K. BECKLEY*

Selling is an important activity in the lives of all of us, and there is a need for schools to be cognizant of this fact in the setting up of curriculums. A knowledge of salesmanship is of value not merely to those students who may be planning to go into sales work as a career, but to the other members of the student body as well.

Analyses of industrial occupations carried on by the Rochester Athenaeum and Mechanics Institute emphasize the fact that persons who will eventually be advanced into supervisory positions in business need an understanding of buying and selling techniques. These job studies in the field of publishing and printing led to the introduction two years ago of a course in salesmanship as a part of the regular curriculum in this department. This course is taught for one hour each week in the final semester of the senior year, and although originally offered as an elective, has since been made a requirement for all senior students in the department.

The principal objectives in presenting a course in salesmanship to such a group are twofold. First of all, since our students are trained for supervisory jobs — printing plant foreman, for example — we consider it highly desirable for them to have a background knowledge of the psychology of salesmanship, as mentioned above. This will be of value to them in any jobs they may hold after graduation, since they will of necessity have occasion to sell their services to prospective employers, and in most cases will find it necessary to cooperate with salesmen as a part of their job.

A second objective of the course is to acquaint the students who may be interested in jobs as salesmen of printing equipment or printing materials with the techniques of salesmanship as applied specifically to these types of products. Hence we consider the most desirable approach to include both background information of a general nature on salesmanship, and also material on methods of selling printing products. In the past few years this field has come to be increasingly popular among our graduates.

In the actual organization of the course it seemed advisable to collaborate with the institute's department of retailing, which offers work in salesmanship as a regular part of its curriculum. From this collaboration a plan was drawn up whereby the course is organized and taught by a member of the faculty of the department of retailing, who is assisted by the faculty of the department of publishing and printing in giving the course the necessary practical application.

We find it best in this course to conduct a number of discussions on sales psychology, methods, and problems, similar to the material which would be presented in a general course in salesmanship. In addition, various persons other than the regular instructor are brought into the class at intervals during the semester. They present through informal talks followed by an open question period, different viewpoints and experiences specifically relating to the application of salesmanship to printing. We feel that the course has been made doubly effective by the enthusiasm and interest shown by these guest instructors, of whom several have been members of the institute faculty, and the others have been representatives of commercial printing concerns.

Two of the faculty members who talk to the class are regular members of the publishing and printing staff who discuss the information relating to their own respective fields which a salesman would need to know. A third was the supervisor of the department of publishing and printing, whose regular work includes the planning and purchasing of the institute catalogs and other printed materials. Since he is contacted regularly by a number of printing salesmen, he speaks to the students from current and firsthand experience about what the prospective purchaser of printed products expects of a salesman, and can describe the good and bad features of a number of typical representatives of the trade.

The speakers who came in from the outside have thus far all been representatives of well-known Rochester printing firms with which the students are acquainted through having been taken on tours of the plants, or in some cases by having worked for these firms during their vacations. Hence the students are familiar with the type of work done by the organizations represented.

Thus far, all but one of these outside speakers — there have been three each year — have been successful salesmen. The only serious difficulty in securing their services as speakers has been in finding a class period which would fit in with their schedules. In every case, they have been most cooperative and anxious to be of assistance in making the course a success. Generally, they have not been assigned a topic on which to speak, but instead were told the purpose of the course, and asked to speak informally to the students regarding the points which seemed to them from their own experience to be of the greatest importance. This procedure has worked well, and there has been but little duplication in the material the various speakers have presented.

Several of those who were asked to speak to the class expressed the fear that they were not qualified to talk before such a group, and were afraid that in their presentations they would digress far afield of the subject. There proved to be little reason for this concern, however, as their talks were well organized, and contained many useful suggestions.

The speakers in the course thus far have discussed subjects such as: "The Salesman's Part in Creative Printing," and "What the Salesman Should Know About Layout." One of the salesmen brought with him samples of some of the recent work his company had produced. Using these samples as illustrations, he pointed out to the class the wide variety of printed materials which could be made to meet customers' needs, and told of the purpose for which each of the items he had brought had been designed, and what the salesman's part had been in the preparation of it. The one speaker who was not a salesman, as mentioned previously, was a typographer. He has spoken to the students each year on "What the Salesman of Printing Needs to Know About Typography."

When there is a speaker, the class hour always closes with a question period which the speakers seem to enjoy as much as the students do, since the former naturally feel more at home in answering individual questions than in giving a talk. These periods give the students and the faculty members who are present an opportunity to become better acquainted with the speakers than would otherwise be possible.

The topics discussed during the other class periods have included: "The Background of Modern Selling," "Preparation for Selling," "Arousing Interest in Your Product," and "Inducing Action to Buy."

We are anxious to keep this course in salesmanship as practical as possible, and anticipate that there may from time to time be revisions necessary in order to adapt it to the ever changing needs of the students. Thus far, however, it has thoroughly justified its inclusion as a regular part of the curriculum.

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Testing and Tests

9B MECHANICAL DRAWING TEST

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It will be freely admitted that many drawing teachers seldom, if ever, use written tests because they see little value in them. They rely solely on their subjective judgment in deciding what shall be taught and what grades shall be assigned. This judgment is made on the basis of the quality and quantity of work produced, and failure results when an arbitrary minimum standard is not achieved. Grades are solely product ratings. We are not questioning the competency of this method in the shop and drawing room, although investigations of subjective marking in academic work have revealed almost unbelievable variations. Neither do we wish to minimize the importance of product rating in manipulative subjects such as shop and drawing. When a boy's work is laid out on the bench there is no argument about his achievement *as far as we are able to see*. There may be some doubt, however, as to whether or not he understands the principles involved in his drawings and their general value to him. We are all aware of the fact that very often a well-executed drawing is the result of mere copying, either from the book or from a neighboring student's work. Such a drawing portrays manipulative skill but not necessarily understanding. A well-constructed achievement test can point out to what extent intelligent comprehension has been gained. It is of particular importance, in a sequence subject covering several semesters, that the work of the first semester, the time during which basic concepts are formed, be carefully evaluated. Common sense dictates that it is both unwise and unjust to advance a student to a phase of work above his capabilities. The final achievement test results act as a guide and a check on the teacher's subjective rating.

There is still another condition which the final achievement test may reveal, but it is not evident in the product of the student. Many drawing teachers, particularly those who have had commercial experience, are inclined to view all pupils as future draftsmen. Many are further influenced by the conditions which prevailed when they were students, a time when the high school was more or less of a selective institution. Under present conditions of large, heterogeneous groups, a very small percentage of the students will become draftsmen and designers, engaged in the production of formal drawings. It may be assumed, and it becomes increasingly evident under the requirements of national defense, that a large percentage of our students will become technical men of some kind and have occasional contact with drawings. To this group intelligent comprehension is as valuable as good execution. This point seemingly has been overlooked, and in neglecting this consideration we are underestimating the value of our work. In this light, the boy who draws poorly but knows what it is all about, as revealed by tests, is not the failure we might otherwise judge him to be. This is not to be interpreted as a plea for lower standards or as an alternative for good craftsmanship, either on the part of the pupil or of the teacher. We are simply suggesting that the use of tests might widen the range of values of our work and aid in the intelligent selection and better preparation of our future technicians.

Although we are discussing mainly the final achievement test because of its wider implications, mention should be made of the diagnostic test before leaving the matter of why we should measure. This type of test is perhaps one of the most effective teaching tools at our disposal. Well-constructed diagnostic tests, administered occasionally, will raise the level of achievement by eliminating unnecessary reteaching and by pointing out pupil lack of comprehension of principles and procedures at the time they are most needed. It is too late to do any correcting or improving on the final marking day. This suggests the thought that if the final achievement test is given a few weeks before the end of the semester, the test results will form a valuable source of material for review during the final weeks.

What Shall We Measure?

Every course available to our students should have definite objectives, attainable by the average student taking the course. It is not sufficient in our drawing courses, for example, to simply inform the boys that so many plates will be required. They should know what they are going to study, why they are going to study it, and when they have reached their goal. In initial (9B) high school mechanical-drawing courses, these general objectives may be set up: the acquiring of an understanding of the function, the place and the importance of mechanical drawing in the industrial field; the acquisition of initial skill in the creation of simple mechanical drawings, and the development of habits and qualities which characterize the competent technical man. These general objectives may be stated in more detail as follows:

1. A clear understanding of the nature and function of mechanical drawing, i.e., the language of the technical man.
2. Acquaintance with, and acquisition of initial skill in the use of drawing equipment.
3. Understanding and a working knowledge of:
   a) The basic principle of orthographic projection,
   b) Various types of lines and symbols used.
4. Acquaintance with simple methods of pictorial drawing.
5. Understanding of the rules of dimensioning, and the acquisition of initial skill in the use of these principles.
6. Acquisition of initial skill in the formation of letters, figures, and arrowheads.
7. Training of the powers to concentrate and to visualize.
8. Cultivation of the habits of neatness, accuracy, and systematic planning and execution.
9. Ability to translate simple, printed instructions, and pictorial representations into working drawings.

If these objectives are set up at the beginning of the term, if the students are informed of them, and if the plan of action in the classroom is aimed at the achievement of them, then the final achievement examination should be a measure, in part, of the extent to which each individual has succeeded in mastering these objectives.

How Shall We Measure?

It has been pointed out that the final achievement test is not a substitute for the teacher's product rating. Rather, it is supplementary to it. The subjective judgment of the teacher should be balanced by an objective scale. The so-called "new-type" tests, embracing alternate-response, matching, best-answer, simple recall, multiple-choice, and other types, lend themselves more readily to objective scoring than the traditional, essay type. In addition they are generally easier to score, require less administrative time for covering a given field, and at the same time permit wider sampling. Consequently we are confining the balance of our remarks to the new-type tests.

Some authorities are of the opinion that the sole purpose of the achievement test is to provide a basis for rating pupils. Lindquist[1] states that the principal purpose of the general achievement test is "to enable us to rank the pupils in a given group." From this it follows, that test items which are answered correctly by all of the students and items which are answered by none of the students have no functional value in ranking pupils. We are not quite in accord with this theory, although the last statement concerning difficult items is a matter of common sense. No test, under any circumstances, should contain items over the pupils' heads. We believe that a final achievement test should primarily reveal to what extent the students have approached the objectives of the course; whether or not they have an adequate foundation upon which to build further achievement in a given field. Revelation of mastery is the primary function of the test; ranking is secondary. "Is the boy ready to go on to an advanced class?" is more important than the grade he should be given. Hence it seems reasonable that the final test items should cover: (1) information which the average student should have mastered in order to be able to do the work of the next higher level, i.e., attainment of minimum requirements; (2) information of increasing degrees of difficulty which reveal student advances beyond these minimum requirements. Number one tells us who have failed and number two ranks the successful students according to their above-minimum achievement.

The following are a few of the more important considerations to bear in mind when building a final achievement test for mechanical drawing:

1. Test items should measure the degree to which the student approaches the stated objective of the course. In manipulative subjects such as shop and drawing some of these objectives cannot be measured by written tests.
2. Alternate response items (true-false, yes or no, right-wrong) are open to the defect of guess-

[1]Linquist, Hawkes, and Mann, *Construction and Use of Achievement Examinations.*

ing. Correction should be made for guessing, using the formula: Score = Right — Wrong. Some authorities believe that credit should be given to the student "who knows that he doesn't know" by using the formula: Score = Right minus Wrong plus one half of the omitted items.

3. Do not use more than three or four different types of test techniques in one test, nor more than one type in a given section of the test.

4. Responses should require a reasoned understanding of the concept tested, rather than the recall or recognition of the proper response by means of catch phrases, clues, and cues.

5. Make certain that the point of the test item is clear and definite.

6. Emphasize the "why," "wherefore," "how," and the "explain" or "interpret" type of questions.

7. Although the simple recall types requiring completion by the use of a single word, are very easy to make, they incur weaknesses suggested in numbers 4 and 6.

8. Final achievement tests used to supplement product ratings should emphasize reasoned understanding, judgment, and discrimination on the part of the pupil. For this reason the multiple-choice and (in drawing) the practical type are perhaps the more valuable.

9. Avoid statements that are extremely obvious.

10. Avoid determining characteristics such as lengthy statements (usually true), and such words as all, always, never, large, small, few, and important.

11. In matching exercises include two or three extra responses.

12. Multiple-choice questions in which symbols, lines, and samples of work have to be selected can be used to good advantage.

13. Properly sample the field to be tested, without regard for the number of items used.

How Shall We Evaluate?

There are two aspects to the problem of evaluating. One is in terms of the test itself, and the other is the interpretation and use of the test results. Tests are usually judged in terms of their reliability and their validity. Reliability refers to the consistency with which a test measures; a test which produces similar results under similar circumstances is said to be reliable. Perhaps the most satisfactory way of determining the reliability of informal classroom tests is to break the test into two halves, odds and evens, and correlate the halves. Because of the fact that in thus shortening the test we lower its reliability it is advisable to use the Spearman-Brown Prophecy formula for correction:

$$r \text{ (of the whole score)} = \frac{2\ r \text{ (odds and evens)}}{1 - r \text{ (odds and evens)}}$$

Reliability is secondary to, and a phase of the most important but most elusive characteristic of a test — its validity. Validity is the extent to which a test measures what it is supposed to measure. It is a highly specific concept, in that it is measured only by the degree that a test accomplishes a specific purpose for a specific group. In the case of our test we are measuring the amount of learning accomplished by the individuals of a 9B drawing class. We assume that the responses to the samples of learning selected can be considered representative of, and an index to an individual's total learning in 9B. Because of the highly specific nature of validity we must depend largely on subjective judgment rather than on correlation with standardized tests or other scientific methods. The most practical methods of validating tests consists of inspection by competent subject experts, and by comparison with similar tests, product ratings, and teachers' marks. We have advanced the theory that some students who do poor work on the drawing board will do much better in the test. If this is true we will find only a fair correlation between mechanical-drawing product ratings and test results; but we should also find a high correlation between the test results and grades in the pupils' academic subjects, such as science and math. The latter would indicate that success in the drawing test is due to general intelligence, and that the test, indirectly, is an intelligence test. In other words, given a student with normal or above mental ability, we should be able to put over the basic concepts of drawing, regardless of whether the student has aptitude for the work. In these cases it is our job to make the work interesting enough to make the student overcome his native inaptitude.

A major function of an achievement test is guidance. This point is obvious enough with regard to diagnostic tests and is easily followed. It is equally obvious in the case of a final achievement test, but do we observe it? Assume a boy whose work on the drawing board indicates lack of skill to be able to make acceptable drawings, and whose test results show inability to comprehend the principles involved. Under our present system of grades, large classes and differentiated curriculums there are three courses which might be followed. One is to promote him and let him drift further behind. This, unfortunately, is perhaps the most common course. Another is to fail him and let him repeat the proceeding. There is little evidence to show that this procedure is worth while. The third and most sensible course, if guidance means anything, is to gently and diplomatically, but firmly advise the lad, and his parents, that he is in the wrong pew; that he should not only go on in the drawing room, as it is now set up, but that he will not be permitted to go on. Practically, this does not mean that he must be sent to a special school, or that he will fail in some other field, or that he must be turned out on the street. A sensible consideration of the problem might point to the establishment, within the large school, of ability groups, of special drawing rooms for low normals, with a new and radically different course of study emphasizing, perhaps, freehand and pictorial drawing.

Scores on final achievement tests have relative value only, i.e., they can usually be evaluated only in relation to the scores made by other pupils on the same test. These scores can be converted into percentile ranks, or into grade levels by following a fixed distribution scheme based on the normal probability curve. This scheme results in a fixed proportion of grades regardless of the comparative achievement level of the group. A more satisfactory method is to group the distribution around the mean score of a particular group. In this scheme, pupils whose scores lie below a certain point (average minus two average deviations) are classified as having failed. This discussion of scores is more or less theorectical with regard to manipulative subjects such as shop and drawing. Final test scores serve to supplement the teacher's subjective judgment of the student's bench-work; they help to emphasize and identify individual differences.

Composing, administering, and scoring an achievement test is only half of the battle. Candidly, such a test is of very little value to the student. Its value lies in the analysis made by the teacher of test results. Scores on each item should be tabulated. Weak scores should be noted. Perhaps the item is obscure. Or the point covered by the item was not brought out during the semester. More probably, we took it for granted that the boys understood, and waited until the end of the term to find out that only 38 per cent or 44 per cent of the class understood what we were trying to explain, and what they were frequently exemplifying on their plates. Weak items should be noted and rewritten. Notes should be taken on these points to emphasize in similar classes in future semesters. Not merely scoring but also tabulating individual items means work. But after three or four times we begin to whip the test into fairly acceptable form, and become aware of the weak spots in our work. Such efforts will be rewarded by a more alert, better informed, better satisfied group of boys who will feel that they are getting somewhere, whose increased performance will be enough reward for any teacher.

Final Achievement Examination. 9B Mechanical Drawing Part I

Read the following statements carefully. Place a *T* before each statement that you think correct, and an *F* before each statement that you think is false.

Example: (F) George Washington was the third president of the United States.

If you are in doubt about a statement, pass it up. *Do not guess.* Score equals right *minus* wrong.

( ) 1. The point of a compass should project slightly beyond the lead.
( ) 2. All drawing triangles have 45-deg. angles.
( ) 3. Drawings made in Chicago can be used in Boston.
( ) 4. Machine parts can be accurately described by a written description.
( ) 5. Very soft leads should be used in compasses.
( ) 6. Pencil lines should be erased with Artgum.
( ) 7. An electrical engineer does not need to be familiar with mechanical drawing.
( ) 8. Cabinet drawings are easier to make than isometric drawings.
( ) 9. Ability to read blueprints has no connection with mechanical drawing.
( ) 10. Light should come to the drawing board from the right-hand side.
( ) 11. Center lines are essential on all drawings.
( ) 12. An Englishman would have trouble reading an American mechanical drawing.
( ) 13. Hardwood, such as white oak, is best for drawing boards.
( ) 14. Drawing equipment should not be marked with the owner's name or initials.
( ) 15. Accuracy of the drawing is more important than the cleanliness of the paper.
( ) 16. Every technical man should have some knowledge of mechanical drawing.
( ) 17. Large compasses should be adjusted to move somewhat stiffly.

( ) 18. Auto mechanics should be expert draftsmen.
( ) 19. Placing the head of the T square against the top of the drawing board is an acceptable way of making vertical lines.
( ) 20. The sole purpose of a mechanical drawing is to show the correct shape of an object.
( ) 21. Vertical dimensions should be read from the right-hand side of the drawing.
( ) 22. Simple, plain letters and figures are used on mechanical drawings because they are easier to make.
( ) 23. Isometric drawings are made with the aid of a 30-deg. triangle.
( ) 24. Dimensions should read in line with the dimension line.
( ) 25. It is considered poor practice to extend center lines beyond the outlines of the object.
( ) 26. A good pencil drawing has heavy, engraved lines.
( ) 27. Time should not be wasted in making preliminary, freehand sketches.

Right ..... minus wrong ..... = score .....

Part II

In the following questions, select what you believe is the correct response, and place the corresponding number in the parentheses at the left of the question.

( ) 1. Mechanical drawing is (1) a study of pictures; (2) the language of the technical man; (3) a course required in every high school; (4) a system of copying drawings.
( ) 2. Well-proportioned titles, with neat lettering, are required for which of the following reasons? (1) Lettering is the most important detail of a drawing; (2) gives the drawing a finished appearance; (3) makes it easier to understand the drawing; (4) gives complete identification of the drawing; (5) increases skill in the use of lettering triangles.
( ) 3. Draftsmen frequently sharpen their pencils for which of the following reasons? (1) Sharp points move more easily across the paper; (2) permits more accurate work; (3) makes the pencil lines more visible; (4) allows the draftsman to work more closely to the T square or triangle.
( ) 4. What distance should be allowed between the drawing outline and the dimension line? (1) 1/8 in.; (2) 5/16 in.; (3) 1/2 in.; (4) a full inch.
( ) 5. Isometric drawing is (1) an example of orthographic drawing; (2) a simplified method of perspective drawing; (3) a method of drawing used in foreign countries; (4) a necessary part of every working drawing.
( ) 6. Dimensions are placed on a drawing: (1) to enable the draftsman to check his drawing; (2) to improve the appearance of the drawing; (3) to indicate the proper size of the various parts; (4) to enable him to redraw the object, if necessary; (5) to encourage the habit of neatness.
( ) 7. Cabinet drawing is: (1) the same as isometric drawing; (2) a simple method of pictorial drawing; (3) a more practical method than orthographic drawing; (4) a method of drawing developed by the furniture industry.

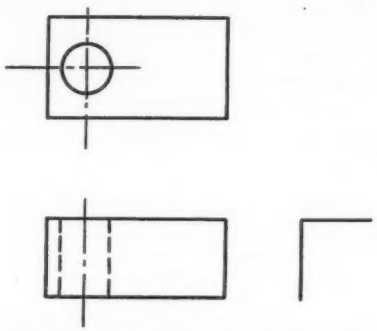
Score = No. of correct responses .....

Part III

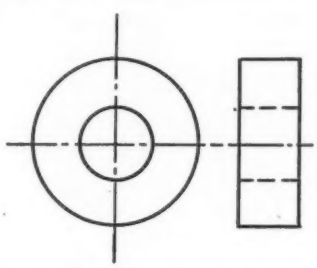
In the following examples of mechanical drawing principles, and the proper use of conventions, complete each question according to your best judgment. There is no penalty for guessing. It is not necessary to know the dimensions of any of the samples shown.

1. The top and front view of this block are correct.

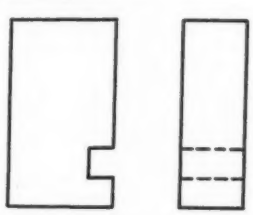
Problem: Complete the side view. You can do this freehand.



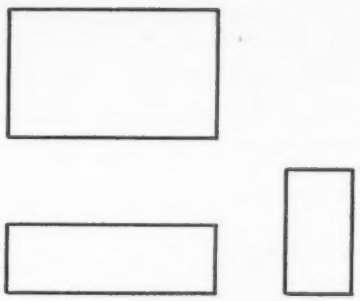
2. This cylindrical ring is to be made of wood. Two views are shown. Is a third view necessary? Yes ..... No ..... Briefly explain the reason for your answer.



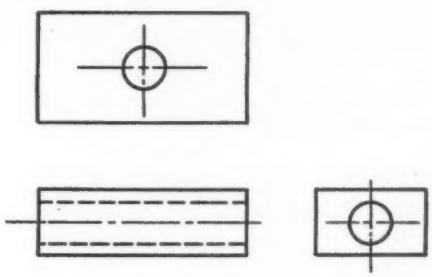
3. The front view in this drawing is not correct, for one of the following reasons. Place a check after your choice of the correct reason. (*a*) Center lines are missing .....; (*b*) invisible lines should be full lines .....; (*c*) side view should be shown .....; (*d*) some lines are missing .....



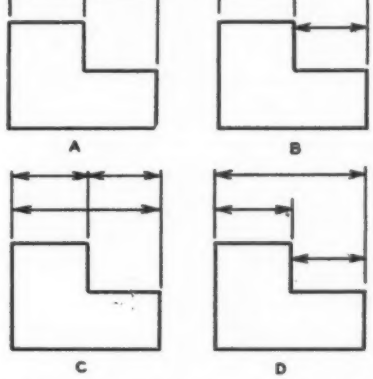
4. The side view in this drawing is not correct, for one of the following reasons. Place a check after your choice of the correct reason. (*a*) Dimensions are missing .....; (*b*) side view should be on the left side of the front view .....; (*c*) the side view is improperly projected .....; (*d*) an isometric view should be shown .....



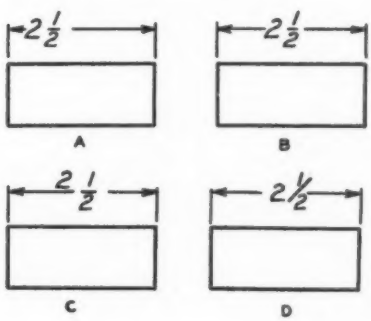
5. Front and side views in this drawing are correct. What is wrong with the drawing? (*a*) The hole is not properly shown in the top view .....; (*b*) center lines should be light, full lines .....; (*c*) size of the hole is missing .....; (*d*) invisible lines should be dot-dash lines .....



6. Select the best method of dimensioning this figure: (*a*) .....; (*b*) .....; (*c*) .....; (*d*) .....

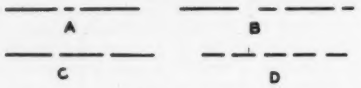


7. Select the best method of placing dimensions: (*a*) .....; (*b*) .....; (*c*) .....; (*d*) .....

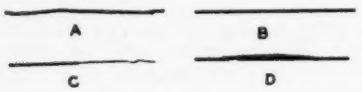


In the following samples of type of lines, indicate your choice of the best sample in each group.

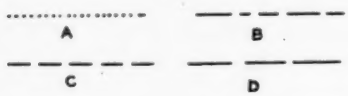
8. Center lines: (*a*) .....; (*b*) .....; (*c*) .....; (*d*) .....



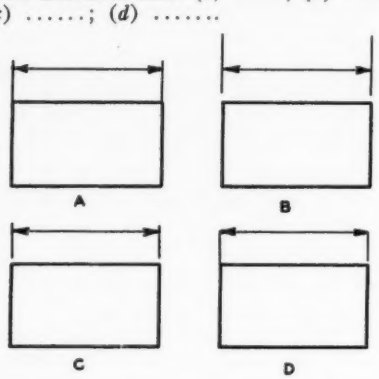
9. Visible outlines: (*a*) .....; (*b*) .....; (*c*) .....; (*d*) .....



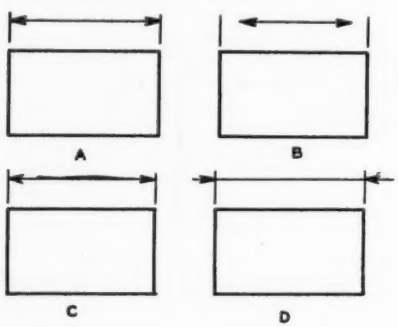
10. Invisible lines: (*a*) .....; (*b*) .....; (*c*) .....; (*d*) .....



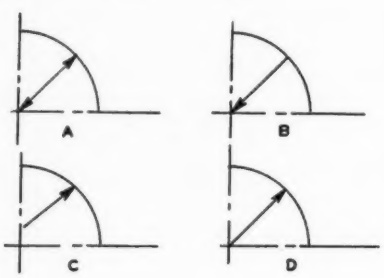
11. Extension lines: (*a*) .....; (*b*) .....; (*c*) .....; (*d*) .....



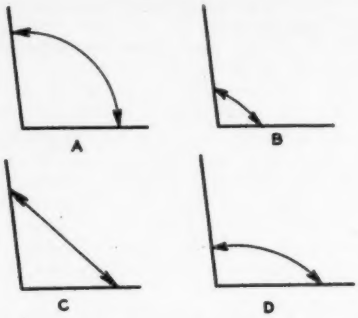
12. Dimension lines: (*a*) .....; (*b*) .....; (*c*) .....; (*d*) .....



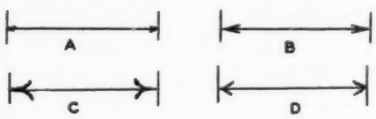
13. Dimension lines: radii. (*a*) .....; (*b*) .....; (*c*) .....; (*d*) .....



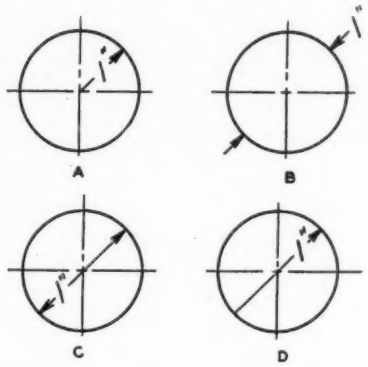
14. Dimension lines: angles. (*a*) .....; (*b*) .....; (*c*) .....; (*d*) .....



15. Which of these is the correct type of arrows to use? (*a*) .....; (*b*) .....; (*c*) .....; (*d*) .....



16. Which of these is the proper way of dimensioning a diameter of one inch, or over? (*a*) .....; (*b*) .....; (*c*) .....; (*d*) .....



17. In the space below, draw the top, front, and side views of a small, solid rubber ball, about 1½ in. in diameter. Draw freehand.

Key to Test

Part I

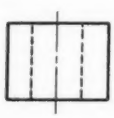
1. T	6. F	11. F	16. T	21. T	26. F
2. F	7. F	12. T	17. T	22. F	27. F
3. T	8. T	13. F	18. F	23. T	
4. F	9. F	14. F	19. F	24. T	
5. F	10. F	15. T	20. F	25. F	

Part II

1. No. 2	3. No. 2	5. No. 2	7. No. 2
2. No. 4	4. No. 2	6. No. 3	

Part III

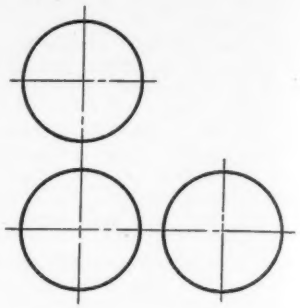
1.



2. No. front and side views are the same.

3. *b*	6. *a*	9. *b*	12. *a*	15. *b*
4. *c*	7. *b*	10. *c*	13. *d*	16. *c*
5. *a*	8. *a*	11. *c*	14. *a*	

17. Three circles



INDUSTRIAL-ARTS DIAGNOSTIC AND PROGNOSTIC TESTS FOR THE WOODWORKING SHOP

ISADORE M. FENN
Roosevelt High School
Chicago, Ill.

This test is divided into four parts and consists of four different types of questions. There are directions before each part of this test. Begin to answer the questions only after you have carefully read the directions. When you have finished one part, go on to the next. Do not spend too much time on any one question. Do not ask any questions after the test begins.

Part I — True and False

Directions. Read each statment carefully. Some of the statements are true and some are false. Place a *T* before each statement that you think is true, and an *F* before each statement that you think is false. You will be penalized for each statement incorrectly marked; therefore, *do not guess.*

Example: (F) Balsa is a heavy wood.

( ) 1. When lumber is wet it shrinks.
( ) 2. Stain is used to bring out the beauty of the wood.
( ) 3. Oak is a softwood.
( ) 4. A hack saw is used to cut thin wood.
( ) 5. A chisel is sharpened on one side.
( ) 6. The width of a board is measured across the grain.
( ) 7. The grain of the wood should be examined before planing.
( ) 8. Wooden containers are used for oily rags and waste.
( ) 9. A crosscut saw is used to cut against the grain.
( ) 10. A chisel may be used as a screw driver.
( ) 11. The surface must be rubbed across the grain after paste filler is applied.
( ) 12. The block plane is larger than the jack plane.
( ) 13. A countersink is used to set a nail below the surface.
( ) 14. A file is used to sharpen a scraper.
( ) 15. Dowels are used in furniture construction.
( ) 16. Furniture is stained after it has been shellacked.
( ) 17. A try-square is used in testing a board for squareness.
( ) 18. To square a board the best surface is selected as the working surface.
( ) 19. A mallet is used to strike a chisel.
( ) 20. Black walnut is an inexpensive wood.
( ) 21. A coping saw is used to saw inside or outside curves in thin wood.
( ) 22. Glue when heated often becomes stronger.

( ) 23. A nail set is used to drive screws below the surface.
( ) 24. The ratchet brace is used when it is impossible to make a complete turn in boring a hole.
( ) 25. Shellac dries much faster than lacquer.
( ) 26. To measure accurately, the rule is set on edge.
( ) 27. A backsaw is used to cut metal.
( ) 28. Basswood is a hardwood.
( ) 29. A bit gauge is used to stop a bit from going in too deeply.
( ) 30. In using a plane for fine work, the cap iron is set 1/16 to ⅛ in. from the end of the plane iron.

Right ..... minus wrong ..... = score .....

Part II — Multiple Choice

Directions. Choose the right answer from the words below the statement and write its number in the parentheses.

Only one answer is correct. *Do not guess.*

Example: (2) A hammer is a (1) ruler; (2) tool; (3) vise; (4) machine.

( ) 1. In sawing a board across the grain, use a (1) ripsaw; (2) coping saw; (3) crosscut saw; (4) keyhole saw.
( ) 2. When planing a long board use a (1) jack plane; (2) jointer plane; (3) smoothing plane; (4) block plane.
( ) 3. In squaring a board, begin first with the (1) edge; (2) end; (3) surface.
( ) 4. To prepare glue, boil glue chips with (1) alcohol; (2) oil; (3) water; (4) turpentine.
( ) 5. To bore a hole in a board, use a (1) brace; (2) bit; (3) drill; (4) brace and bit.
( ) 6. To sandpaper a board, rub (1) across the grain; (2) with the grain; (3) relative to the grain; (4) in any direction.
( ) 7. To mark a line parallel with an edge, use a (1) knife; (2) pencil; (3) marking gauge; (4) ruler.
( ) 8. The brace used when a full turn cannot be made is a (1) expansion; (2) automatic; (3) ratchet; (4) countersink.
( ) 9. The screw that would naturally be set flush with the surface is (1) roundhead; (2) flathead; (3) squarehead; (4) oval head.
( ) 10. The machine used for sawing curves is a (1) lathe; (2) circular saw; (3) jointer; (4) band saw.
( ) 11. The *frog* is a part of a (1) plane; (2) spokeshave; (3) marking gauge; (4) brace.
( ) 12. Very small nails are called (1) brads; (2) common nails; (3) bolts; (4) staples.
( ) 13. Screws are sold by the (1) pound; (2) ream; (3) dozen; (4) gross.
( ) 14. In checking a large board for trueness use a (1) try-square; (2) framing square; (3) ruler; (4) gauge.
( ) 15. No. 3/0 sandpaper is (1) fine; (2) coarse; (3) very coarse; (4) very fine.
( ) 16. Nails are sold by the (1) dozen; (2) pound; (3) quire; (4) gross.
( ) 17. Lumber is sold by the (1) board foot; (2) square foot; (3) cubic foot; (4) square yard.
( ) 18. An expensive wood is (1) basswood; (2) walnut; (3) fir; (4) poplar.
( ) 19. Shellac is prepared by dissolving shellac flakes in (1) turpentine; (2) varnish; (3) alcohol; (4) linseed oil.
( ) 20. To clean paint and varnish brushes, use (1) alcohol; (2) linseed oil; (3) turpentine; (4) varnish.
( ) 21. To grind a tool, use (1) oilstone; (2) emery cloth; (3) file; (4) grindstone.
( ) 22. To sharpen or whet a plane blade, use (1) grindstone; (2) oilstone; (3) sandpaper; (4) file.
( ) 23. The joint used in making picture frames is (1) dovetail; (2) half-lap; (3) butt; (4) miter.
( ) 24. A device on a bench, used to hold a piece of wood, is a (1) firmer chisel; (2) vise; (3) marking gauge; (4) spokeshave.
( ) 25. Which of the following wood is best for tool handles? (1) basswood; (2) hickory; (3) balsa; (4) bamboo.
( ) 26. The teeth of the backsaw are similar in shape to a (1) coping saw; (2) crosscut saw; (3) ripsaw; (4) band saw.
( ) 27. Varnish brushes are made of (1) wire; (2) string; (3) feathers; (4) bristle.
( ) 28. Three-ply is the name of (1) finish; (2) varnish; (3) veneer; (4) bristle.
( ) 29. Dividers are used for making (1) squares; (2) circles; (3) oblongs; (4) triangles.
( ) 30. Cedar is best for making (1) dressers; (2) chests; (3) tables; (4) lamps.
( ) 31. The hammer most commonly used in woodwork is a (1) ball-peen; (2) claw; (3) ax; (4) hatchet.
( ) 32. Putty is made of (1) whiting and oil; (2) glue and paste; (3) flour and water.
( ) 33. To thin house paint, use (1) benzine; (2) alcohol; (3) water; (4) turpentine.
( ) 34. Door hinges are called (1) butts; (2) strap hinges; (3) tie hinges; (4) surface hinges.
( ) 35. 8d common is the size of a (1) nail; (2) screw; (3) wire; (4) bolt.

Right ..... minus wrong ..... = score .....

Part III — Simple Completion Exercise

Directions. Complete the following statements by placing a single word or phrase in each blank. If you cannot think of the exact word called for but are reasonably certain that a shorter or longer word is equally correct, then write it down. *Do not guess.*

Example: Small pieces of wood on the shop floor will cause an *accident*.

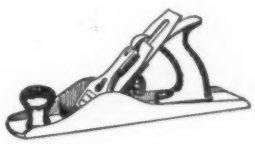
1. Boards are cut from logs at the .....
2. The nails which are used in holding thin pieces of wood together are called .....
3. The ..... is used to lay off lines along the grain, parallel to a given face or edge.
4. The ..... and ..... are used to bore a hole in a block of wood.
5. The age of a tree can be determined by the ..... on the stump.
6. When lacquer has become thick we use ..... to thin it.
7. In planing the end of a board we prevent the further edge from splitting off by ..... it.
8. To check the trueness of an edge that is not a right angle we use a .....
9. We use ..... to close up the pores of open-grain wood before applying a finishing coat.
10. To saw a board parallel with the grain, we use a .....
11. To saw a board across the grain we use a .....
12. Never strike a chisel with a ..... but use a .....
13. Always leave the plane on its ..... when not using it.
14. The tool used to turn screws into the wood is called a .....
15. It is more difficult to plane ..... the grain than ..... it.
16. To bore a hole, the bit is placed in a toolholder called a .....
17. The largest and oldest trees in California are the .....
18. A chamber artificially heated and used for drying quantities of lumber is called a .....
19. The tool used for smoothing a board is a .....
20. A bit which can be adjusted for boring various sizes of holes is called an .....
21. To sharpen a plane blade use an .....
22. A rasp is also known as a .....
23. Tools ..... when exposed to moisture.
24. Varnish is thinned with .....
25. ..... is the natural color of shellac.

Right ..... minus wrong ..... = score .....

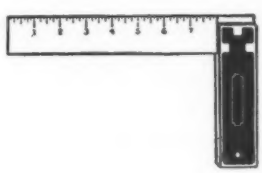
Part IV — Tool Recognition

Directions: Write the name of the tool in the space below the picture. *Do not guess.*

Right ..... minus wrong ..... = score



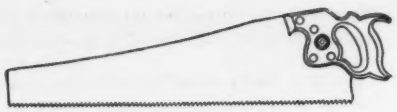
1. _____



2. _____

3. _____

4. _____



5.

6.

7.

8.

Key to Part I

1. T	6. T	11. T	16. F	21. T	26. T
2. T	7. T	12. F	17. T	22. F	27. F
3. F	8. F	13. F	18. T	23. F	28. F
4. F	9. T	14. T	19. T	24. T	29. T
5. T	10. F	15. T	20. F	25. F	30. T

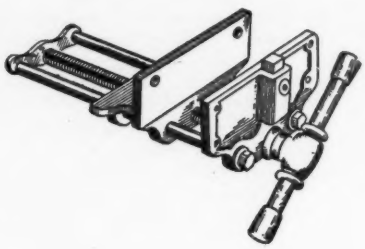
Key to Part II

1. 3	8. 3	15. 4	22. 2	29. 2
2. 2	9. 2	16. 2	23. 4	30. 2
3. 3	10. 4	17. 1	24. 2	31. 2
4. 3	11. 1	18. 2	25. 2	32. 1
5. 4	12. 1	19. 3	26. 2	33. 4
6. 2	13. 4	20. 3	27. 4	34. 1
7. 3	14. 2	21. 4	28. 3	35. 1

Key to Part III

1. Mill
2. Brads
3. Marking gauge
4. Brace, bit

9.



10.

5. Annual rings
6. Lacquer thinner
7. Chamfering
8. T bevel
9. Wood filler
10. Ripsaw
11. Crosscut saw
12. Hammer, mallet
13. Side
14. Screw driver
15. Against, with
16. Brace
17. Redwood
18. Kiln
19. Plane
20. Expansive
21. Oilstone
22. File
23. Rust
24. Turpentine
25. Orange

Tool Recognition — Part IV

1. Plane
2. Hammer
3. Try-square
4. Screw driver
5. Spokeshave
6. Chisel
7. Brace
8. Hand drill
9. Saw
10. Vise

Student Number	Total Score	Age	Student Number	Total Score	Age	Student Number	Total Score	Age	Student Number	Total Score	Age
1	59	15-6	51	45	15-7	101	53	15-6	151	75	14-5
2	80	14-5	52	62	14-5	102	79	13-0	152	49	14-6
3	69	13-0	53	51	14-3	103	31	14-6	153	56	14-1
4	59	14-6	54	73	13-0	104	47	14-3	154	64	14-6
5	43	14-1	55	52	15-3	105	75	15-1	155	64	15-3
6	40	14-6	56	69	14-5	106	64	14-7	156	50	13-0
7	59	14-1	57	60	13-8	107	30	14-6	157	57	14-5
8	35	14-3	58	51	14-1	108	52	15-1	158	46	13-11
9	52	15-1	59	43	14-7	109	65	14-11	159	76	14-0
10	63	13-3	60	59	15-0	110	51	14-3	160	75	14-3
11	67	13-0	61	34	14-8	111	80	13-10	161	68	14-8
12	59	14-6	62	56	15-9	112	47	14-0	162	59	15-3
13	46	14-5	63	54	13-9	113	64	14-1	163	63	14-6
14	52	14-4	64	78	15-5	114	30	14-11	164	44	15-6
15	64	15-1	65	65	16-1	115	65	14-1	165	65	14-5
16	77	13-11	66	72	14-7	116	38	14-5	166	80	13-8
17	51	14-11	67	80	15-2	117	47	16-1	167	35	14-2
18	72	14-0	68	65	13-8	118	73	14-5	168	34	14-4
19	80	14-3	69	82	14-8	119	75	13-11	169	52	15-9
20	54	14-3	70	65	13-0	120	83	13-0	170	60	14-11
21	62	13-10	71	70	14-2	121	64	15-4	171	65	15-6
22	64	14-8	72	68	13-11	122	73	15-9	172	47	14-5
23	56	14-0	73	79	13-0	123	54	13-5	173	68	14-2
24	64	15-3	74	55	14-3	124	41	16-1	174	50	14-0
25	53	14-1	75	75	14-11	125	69	13-10	175	74	14-6
26	43	16-1	76	70	14-8	126	50	13-0	176	65	14-2
27	56	15-1	77	72	14-8	127	77	14-5	177	69	14-11
28	48	14-1	78	64	14-5	128	68	16-1	178	76	13-0
29	50	15-2	79	75	14-3	129	56	14-8	179	79	15-3
30	41	15-6	80	75	13-11	130	57	14-5	180	60	14-6
31	67	15-1	81	47	14-2	131	66	15-7	181	35	16-1
32	65	14-8	82	45	13-0	132	78	14-5	182	64	15-2
33	65	14-3	83	71	13-8	133	67	15-3	183	59	14-7
34	59	15-3	84	58	14-8	134	44	14-1	184	70	13-3
35	75	14-6	85	67	14-3	135	41	15-9	185	81	14-0
36	82	14-10	86	65	14-4	136	44	15-5	186	60	14-5
37	63	13-1	87	73	13-6	137	68	14-7	187	70	14-2
38	60	14-8	88	51	14-0	138	55	13-8	188	65	13-8
39	70	14-0	89	76	14-8	139	71	14-4	189	75	14-5
40	69	13-6	90	59	13-1	140	68	13-6	190	64	14-1
41	62	14-3	91	79	14-10	141	71	14-10	191	73	13-6
42	72	14-4	92	74	14-3	142	73	15-3	192	39	14-1
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46	68	14-8	96	50	15-1	146	63	14-5	196	41	14-7
47	82	13-0	97	55	13-6	147	72	13-11	197	59	14-0
48	70	14-2	98	82	14-8	148	70	14-3	198	68	14-5
49	65	14-5	99	73	14-5	149	34	14-0	199	79	15-9
50	69	14-3	100	44	15-7	150	56	14-8	200	53	14-6

Scores of 200 first-semester high school students in woodworking on the Industrial-Arts Diagnostic and Prognostic Woodwork Information Tests (given during first week of course)

Problems and Projects

MODEL FLINTLOCK PISTOL

GORDON RIETVELD

Milwaukee Country Day School
Milwaukee, Wis.

For the person who enjoys antique firearms, the flintlock has always been a popular model. Thousands of these guns have been made in the past; few, however, remain in circulation due to the fact that many are over 200 years old and have become important professional collectors items.

The flintlock pistol illustrated and described herewith was designed for the model builder, boy or adult. It is both simple to make and carries out the spirit and design of the original weapon. Completed, it makes an excellent piece for the boy's room or as a mantel decoration.

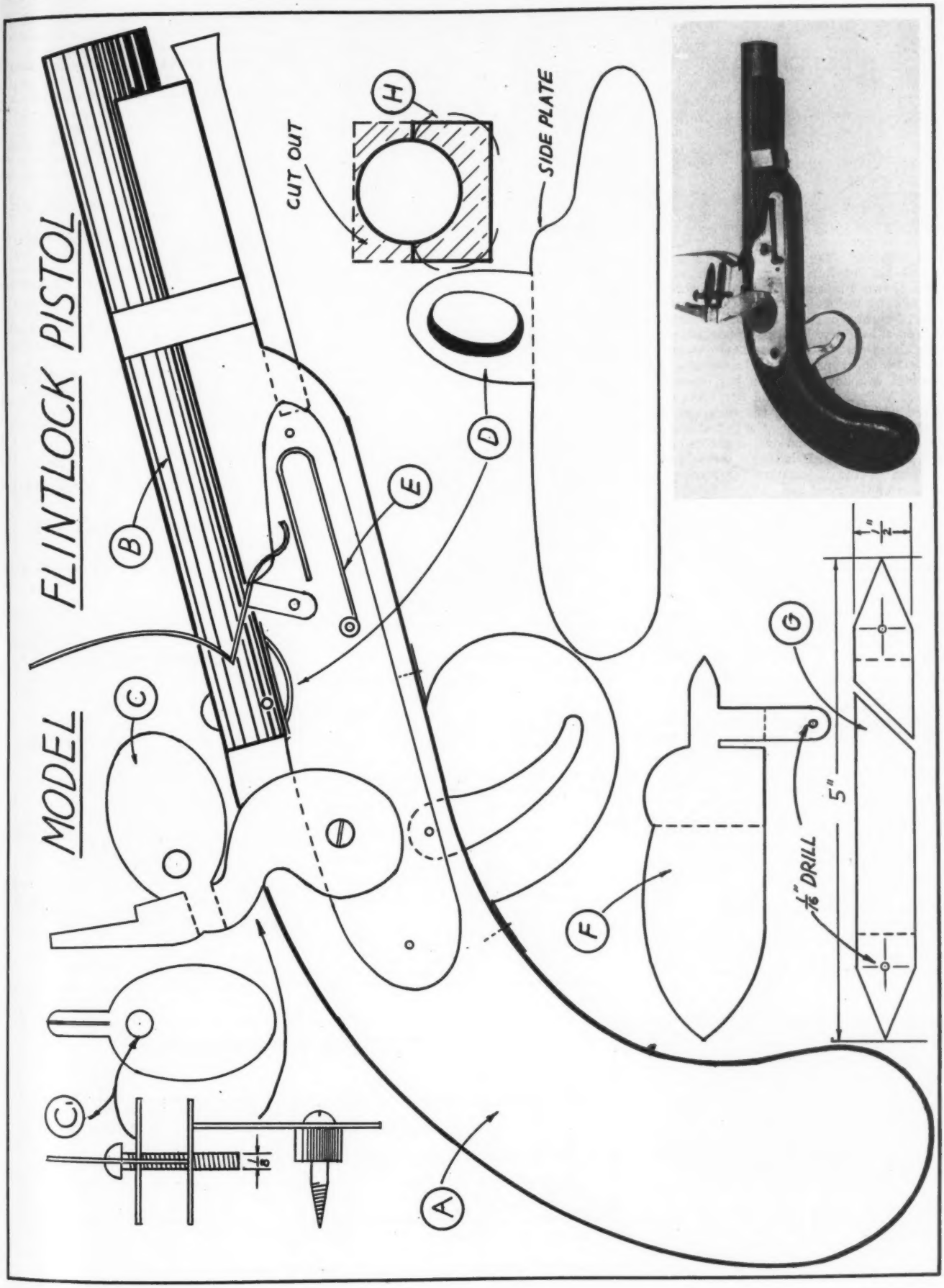
The project was used in a summer school class for junior high school boys. The model shown in the halftone was completed by one of the boys in this class.

The firing of the flintlock pistol seems rather complicated when compared to the modern shell firing gun, but it was done like this:

A small quantity of powder, a ball, and wadding material were placed in the barrel and wedged with a ramrod. In addition, a small portion of powder was also placed in the priming pan (*D*). The hammer (*C*), operated by a spring, had a head like a vise, the two jaws of which held a piece of flint. On the side of the barrel, just above the priming pan, was a touch hole. Above the priming pan, on the side of the barrel, was a hinged cover which had an upthrust wing of furrowed steel (*F*). When the trigger was pulled, the hammer was released and fell causing the flint to strike the winged cover and open it. The shower of sparks resulting from the contact fired the powder in the priming pan; the flame thus resulting found its way through the touch hole and fired the gun.

The gun stock, shown full size in the illustration, is cut from 1¼-in. stock lumber of your own choice. In this particular case pine was used, but walnut is preferable. In cutting the gun stock it is suggested that the cut be made along the over-all outline of the gun so as to allow for the subsequent hole which is drilled to accommodate the barrel. After the gun stock has been cut, a ⅞-in. hole is drilled to the indicated depth. At *H* it will be noted that the upper portion of the stock is then cut away, exposing a U-shaped area having two shoulders. It is very important that the barrel hole be drilled perfectly straight, so it is advisable to use either a dowel jig, an extension bit in a drill press, or constant checking with a try-square if drilled by hand. The barrel is a short 6 or 7-in. length of electrician's conduit casing, ⅞-in. outside, and ¾-in. inside diameter. This is to be buffed to a dull satin finish, or to a polished finish as desired. The shoulders of the stock on either side of the barrel are rounded with a file as shown at *H*. The rest of the stock is finished with a file-sandpaper combination. It is especially important to do a good smooth job so that the grip feels good to the hand.

It is advisable to put a finish on the stock at this point due to the fact that the addition



Model Flintlock Pistol designed by Gordon Rietveld

of other parts makes the use of a brush difficult. Walnut or cherry stain followed by two or three coats of varnish or shellac, rubbed down and waxed, makes a fine finish.

The small touch hole is drilled into the barrel, just above the priming pan, by using a 1/16-in. drill. On the top side of the barrel another hole is drilled with a ⅛-in. drill and a roundhead 1½-in. wood screw is used to hold the barrel to the stock. Near the end of the barrel, a ⅜-in. strip of metal is placed around both barrel and stock and nailed in place in the bottom side. This serves as trim and also aids in keeping the barrel in place.

We are now ready for the metal parts of the pistol. Inexpensive .015 leaded tin was used. The individual may substitute other metals to suit his taste. In cutting out the various parts shown full size on the drawing, it is advisable to use a sharp pair of tin shears or a metal-cutting blade in either an electric jig saw or a handsaw. The side plate of which *D* is also a part is the first pattern to be cut out. The upper part *D* is the priming pan in which a hollow depression has been hammered. After the plate is cut out, the part is placed with the *D* facing the workman. The method used in hammering the hollow into the pan was to gouge out an oval in the end grain of a block of wood. It is then a simple matter to form in the indentation by placing the metal over the wood and tapping lightly with a ball-peen hammer. The priming pan is then bent along the dotted line at right angles to the side plate. The plate is then placed on the side of the stock and nailed in place at the points indicated. For nailing, ½-in. brass escutcheon pins give good trim.

Cut out the trigger according to the pattern, and on the underside of the stock cut a slot to the desired depth and insert the trigger. Drill a hole halfway through the stock, puncture the trigger, and stop. A six-penny finishing nail, countersunk, can be used as a pin to hold the trigger in place. The trigger movement will depend upon the width of the slot.

The trigger guard *G*, dimensions as shown, is cut, bent, and nailed into place. The hammer consists of two parts, *C* and C_1. When C_1 is placed over *C* there results a viselike form. While both pieces are in this position, a 3/32-in. hole is drilled for the bolt insert. In order to make the ⅛-in. bolt fit snug, the hole is reamed out slightly. The hammer is bent to the necessary shape with the aid of a vise. See cross-section view. The small slit at the top of C_1 is made to allow sliding action on the upper part of the hammer, compensating for different thicknesses of flint. A ⅛-in. hole is drilled in the lower portion of the hammer. A small washer is cut from a piece of tubing and placed between the stock and hammer and the two are screwed to the stock with a ⅛-in. roundhead screw. The washer brings the hammer away from the stock to allow it to be centered with the winged cover, *F*. The winged cover is bent in two places. A slight curl is given to the pointed end to allow it to come into contact with the spring *E*. The winged cover is fastened to the side plate by means of a small roundhead screw. The spring *E* is ⅝ in. wide and 3 in. long and is bent and nailed into place as shown. A loop at one end can be made with a long-nosed pliers. Into this loop the nail is placed.

The ramrod, not shown in the halftone, is a piece of ⅜-in. dowel which is cut and sanded to shape and placed in a hole drilled in the stock.

To complete the gun all that is necessary is a small piece of flint. During the summer a short field trip was taken in search of a few pieces of flint. A near-by farmer gave the boys permission to hunt in his fields for some. Enough was found to satisfy the entire class.

If the gun is to be hung above a mantel, it can be suspended by a wire from two small screw eyes placed in the rear of the stock and side.

ASH TRAY

R. J. COLTHARP

Georgia Teachers College
Collegeboro, Ga.

The ash tray pictured here has been found to be a popular project in general shop classes. Because of the variety of materials and processes involved in the making of the tray, it presents a definite challenge to the student; it offers experiences in planning, woodworking, plastic, and art-metal work; furthermore, it provides a use for scrap pieces of wood and metal.

Ash tray

The wood selected for the base should have a pronounced grain; the presence of knots is no deterrent, as these enhance the appearance of the finished project. Walnut, cedar, or knotty pine have been found quite suitable. The plastic is a 3 by ¾ by ¼-in. bracelet blank of a color that harmonizes with the wooden base. Copper, aluminum, pewter, or tin plate is used for the bottom of the ash receptacle.

Order of Procedure

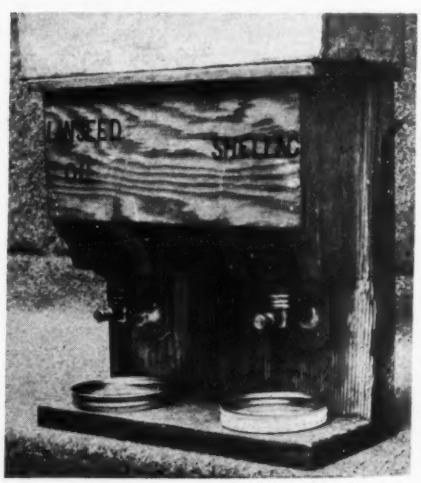
1. Select base, 1 by 4½ by 4½ in.
2. Plane one face of base.
3. Glue base to scrap piece of wood of same size, placing one thickness of wrapping paper between pieces to facilitate removal after turning is completed. Clamp firmly together and let set overnight.
4. Remove clamps and fasten a faceplate to the scrap piece, using ¾ in. flathead screws.
5. Mount on lathe and turn to desired shape and size.
6. Using the parting tool, cut a groove ¼ in. deep for the plastic.
7. Sand carefully with 3/0 sandpaper.
8. Cement plastic in groove, using quick drying cement; wipe off all excess cement.
9. Using a round wood file, cut notches in plastic for cigarettes.
10. Shape plastic as desired, using lathe tools; then polish in lathe.
11. Using linseed oil and shellac, apply a French polish to the tray.
12. Remove from lathe.
13. Cut, tool, and polish metal for bottom of ash receptacle.
14. Cement metal in place.
15. Remove faceplate from block, clamp block in vise, and with a 1-in. chisel and mallet, carefully separate blocks.
16. Lacquer metal and inside of plastic, using at least three coats of clear lacquer.
17. Scrape off all paper from bottom of tray, and glue a disk of thin cork or felt to the bottom.

LOTION DISPENSERS FOR HOLDING FINISHING MATERIALS

J. S. TURNBULL

James Monroe Junior High School
Seattle, Wash.

Keeping the shellac and linseed oil in a lotion dispenser protects against waste, and



Dispenser for finishing materials

Ash tray

the dispensers do not clog as one might suspect.

Small rags are kept in the metal container at the top, so that pupils can readily fold a pad and with a few drops of shellac and linseed oil, burn a finish on their wood-turning projects. Actually, the linseed oil, as we use it from the dispenser, is half linseed oil and half motor oil.

The metal strip shown at the right, is a convenient means of opening the lid of a can of wax, which is also kept in the metal container at the top.

Lids of jars can be used to catch any drippings that may come from the dispensers. It will be found that the lids are always kept clean, for the boys prefer to wipe up the drippings, if any, rather than exert themselves pressing the dispenser knobs.

The two dispensers, shown in the picture, have been in use for three years. The jars are protected from breakage and when empty, can be removed from the wall bracket and refilled.

An extra wall bracket may be placed in a cupboard, to keep the dispensers during the summer vacation or when not in use.

EMERGENCY RED CROSS STRETCHERS

ELWOOD B. HOVEY

Longmeadow, Mass.

The stretcher described herein was made of well-seasoned maple. Oak or ash may also be used. They are made as long as possible, yet will fit inside of the beach wagon. This stretcher proved to be a very desirable project to be put through on the production basis, as twelve were made at one time. Throughout, quality was stressed, and not speed alone. Many boys have the mistaken idea that in production work, speed alone is all-important, resulting in a great deal of waste. According to many manufacturers this idea is prevalent among men, as well, in far too many cases.

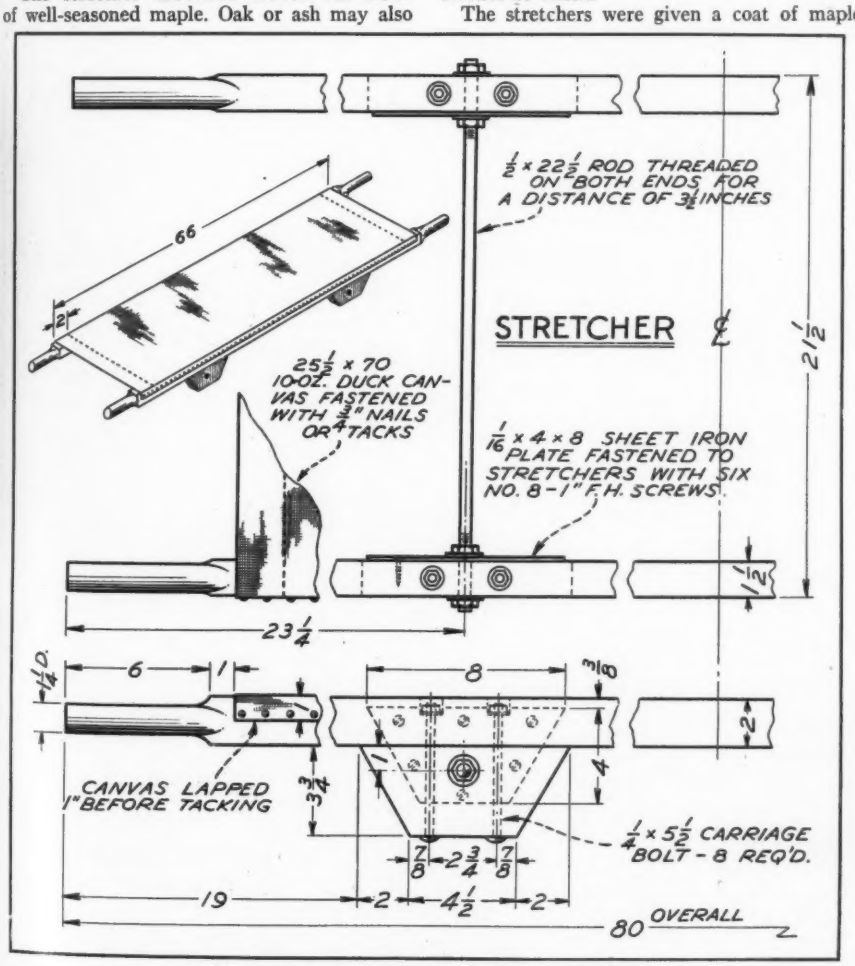
The round steel used was a comparatively cheap material, and we experienced trouble in cutting the threads. We found that by running the rods across the emery wheel, thus removing the scale, the die did not tear the threads so much.

The stretchers were given a coat of maple stain and then a coat of varnish. The canvas being 30 in. wide had to be cut to size. After marking laps on the ends, the girls in our sewing department stitched them on the machine. We then used brass tacks to apply the canvas to the frames. The bolts were loosened first, and then tightened afterward. We left about ¼ in. of the bolt sticking out for tightening later as needed.

Emergency Red Cross stretchers

Bill of Materials

No. required	*Material*	*Size*	*Name*
2	Maple	1½ x 2 x 80	Stretchers
4	Maple	1½ x 3¾ x 8½	Legs
2	Steel rods	½ dia. x 22½	Bolts
4	Wrought iron	½ washers	
8		½ hexagonal nuts	
4	Sheet iron	1/16 x 4 x 8 plates	
24	Flathead screws	No. 8 x 1	
1	10-oz. canvas	25½ x 70	
	Nails and tacks	¾	



Red Cross emergency ambulance stretcher

PLYWOOD PRAM DINGHY

JAMES MC GREGOR

Polytechnic Elementary and Junior High School

Pasadena, Calif.

This type of boat is suited for the boy who desires one at a low cost, which can be built in a minimum of time, and is within the boys' constructional ability. The use of plywood for sides and bottom eliminates the use of planking and much caulking, all of which takes much time and skill.

This does not mean that any boy in a shop class should be allowed to build this boat. Dependability and at least average ability to use tools should be required. A boy tackling this job should understand that he is undertaking a project which will demand much of his time for the school year. If he is the type who cannot keep his attention long on one job, it would be better that he did something else.

Keel and other forms in place ready for the boat-building operations to start

Pram dinghy details

This plywood dinghy, although small, weighs a little over 60 lb., and will carry three people.

Form or Mold

As may seem from the working drawing, a form or mold is recommended over which the boat may be built in an upside-down position. Although the boat can be built without the use of a form, the experience which the boy will gain, as well as the solid foundation which the form provides while the various parts of the boat are built, make its construction well worth the little extra effort and cost. To build a boat is the objective at first glance, but to give the pupil as many experiences while building is also a primary objective, and this should be kept in mind. The use of a form is, therefore, justified, because it gives additional experiences.

The inside keel form is laid out on a ¾ by 8-in. board. Four notches are cut on the curved edge, later to receive the four ribs. Notches *A* and *B* are cut to receive the temporary transverse molds which hold the sides of the boat in place until the ribs have been installed. Bow and stern stems of the form are next cut and nailed in place to the keel mold and braced securely to the latter.

The transverse forms for notches *A* and *B* are then made. Since these are quite wide, gluing up in two pieces for each will probably be necessary. These transverse molds are notched in the top or curved edge, so that when they fit into notches *A* and *B* they will be flush with the curved edge of the inside keel form. This joint is, of course, nothing more than the time-old half-lap joint. The transverse forms are then put in place at notches *A* and *B* and securely held in place by four wedges, two at each notch. These wedges slide one against the other, and if driven in evenly and carefully no difficulty should be experienced in getting the transverse forms at right angles to keel form.

The form or temporary mold to build the boat over, now being complete, may be placed on two sawhorses. These horses should not be too wide, not more than 24 in. or they will interfere with the sides of the boat. The form is securely fastened to the horses and braced in a plumb position. The sawhorses are also fastened to the floor.

This holds the entire structure solidly and rigidly, ready to receive the members of the boat.

Transoms

These are next laid out, and it goes without saying that all laying out should be done with the utmost accuracy.

The dimensions given in the drawing for both bow and stern transoms are as they appear on the outside of the boat when finished. When marking out the edge bevels, be sure to apply the bevel to the outside of the transom and not to the inside.

The side bevels, that is those formed on the ends of the transoms, are given in degrees in the drawing. These angles may be laid out on a piece of paper with a good protractor, and transferred to the wood with a bevel. While the bevels are set, it also would be well to mark the corner cleats for bow and stern, since the angles on those are the same as for bow and stern transoms. Top and bottom edges are cut and shaped square, and are later when fastened to the sides, beveled to conform to proper contours.

After planing the edges of the bow and stern corner cleats, a notch should be cut at the bottom end of each piece, to receive the chines. This is much more easily done before fastening to the transoms.

At this point it would be well to take up the question of the merits of the different kinds of glue.

While the newer type of resin glue is commendable, the instructor concerned has to consider the length of the shop periods. If these are long, resin glue is fine, because the gluing and fastening can be completed in the time available. In the case of short lesson periods, the gluing cannot always be completed at one time, hence a glue which does not set so quickly as resin glue would seem advisable and a marine glue might well be used.

With marine glue, a ½-in. cotton tape should be used in addition, and set between the surfaces to be fastened.

Bow and stern corner cleats are to be fastened with glue and with ¾-in. brass screws, the screws to be put in from the outside of the transoms, into the corner cleats.

Bottom floor cleats should next be fitted and fastened with screws to the transoms. This is more easily done now than later when the boat is partly assembled. These floor cleats project ½ in. above the transoms on the bottom edge. This is sufficient to allow for beveling off to proper contours after the sides of the boat are in place.

Sides

The two plywood sides are next, and here it should be remembered that we are dealing with Douglas Fir Exterior Plywood, made by the resin bonded hot pressed method. This plywood bears the brand on the edges of the sheets, EXT-DFPA. If the wrong type of plywood is used, the results will be discouraging. For example if an interior type of plywood is used, it could not be expected to stand up in the water, because it is not made for that purpose.

Lay out two plywood sides, or if there are a number of dinghys of this type being built, perhaps you would rather have the boys make a master pattern to be used in checking all the boats. The two sides are laid side by side on one of the 4 by 8 sheets, taking care not to have more waste than is necessary for cutting. Some boys if not cautioned will spoil the edges by not using a saw with fine teeth. Care is essential in cutting so as not to splinter the edges.

Assembly

Bow and stern transoms should be clamped in place onto the form or mold, which you have set up on the sawhorses, and lined up accurately. A good method is to have center lines drawn on the stem and stern pieces of the form, as well as center lines on the transoms. By keeping the center lines together when clamping, no difficulty will be encountered.

If the chine pieces are beveled off on one edge from ¼ in. to nothing, there will be less planing to be done when these are put in place. These chines are cut to length and the proper bevels cut at each end, then bent round the transverse forms, fitting into the notches on the top edge of the forms. Two ¾-in. brass screws well countersunk will hold the chines to the notches in the corner cleats. No difficulty should be experienced in bending if straight-grained chines are selected.

The two plywood sides are then clamped in place, and a good supply of small C clamps should be available for this job. Clamping may be done at the bow and stern corner cleats. After a trial assembly of the two sides, either the marine or resin glue may be applied to the side of the chine, and the edges of corner transom cleats. If marine glue is used, the addition of a layer of ½-in. cotton tape is desirable between the two surfaces to be glued. Spacing screw holes evenly will add to the appearance of the completed job. Countersinking of screws in the plywood is not recommended, because it is so easy to countersink too deep for such small screws. Screws are simply driven in flush along the chine pieces and into the corner cleats. No screws are put into the ends of the wood in the case of bow and stern transoms. At bow and stern transoms and transom corner cleats use ¾-in. screws, and along the chines ⅝-in. screws.

Smoothing off the edges of the sides to be in line with the chines, and also smoothing off the bottom edges of bow and stern transoms, is a very important part of boatbuilding. A good job which will insure a tight-fitting joint when the bottom goes on is essential.

Ribs

There is some difference of opinion among boatbuilders about putting ribs in such a small boat. True, the ribs can be left out, and the middle seat if securely fastened will make for a fairly strong boat. Here again is a point in construction where the pupil may gain considerable experience, which will justify the extra effort, required to install ribs.

The bottom parts of the ribs are first fitted in place. They are to be slipped right into the notches provided in the keel mold, fitting close up against the chines at their ends. The curves on the bottom of the ribs are so slight (⅝-in. crown at rib 1, 5/16 in. at 2, and ⅜ in. at 3 and 4), that these curves may be planed off and shaped after the ribs have been fastened in place. The sides of the ribs are fitted and notched at the bottom ends, so as to fit snugly at the chines. The corner plywood braces are then cut and inserted. The whole rib assemblies may now be clamped in place and fastened with screws. The sides of the boat are screwed to the ribs from the outside, but no fastening of the bottom is made to the ribs. Make a final checkup of the bottom edges of bow and stern transoms, as well as the chine edges, and the bottom edges of the ribs, to see that everything is in line.

Bottom

By clamping a 4 by 8 sheet of plywood on the bottom of the ribs, one will soon find out if there is any more fitting to be done. Considerable time and patience will probably have to be exercised here in order to get a good snug fit.

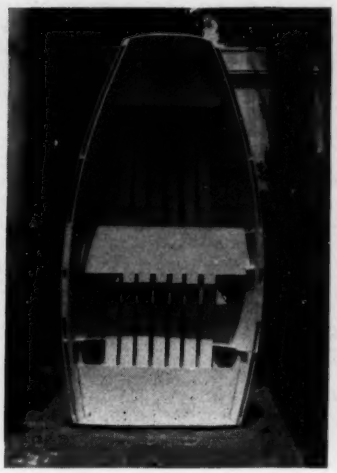
No pattern of the bottom layout has been given in the drawing, because that can be easily obtained from the boat itself.

After clamping the bottom in place, mark underneath close to the sides of the boat at the chines, and along the bottom edges at bow and stern transoms. When cutting to shape allow ⅛ in. outside the lines for trimming off after the bottom is screwed in place.

When the glovelike fit of the bottom to the chines, bow, and stern has been achieved, the job is ready for gluing. If marine glue is used ½-in. cotton tape is set between surfaces. It should be well glued, of course.

Gluing and screwing on the bottom should be planned so as to be completed during one session, so as not to have any open joints. When screwing down the bottom be sure to

Sanding the bottom



A view of the inside of the dinghy

A side view of the finished dinghy

start at the middle of the boat and work toward bow and stern. This will prevent any buckling of the plywood. Screws are ⅝-in. brass, and are inserted directly into the edges of the chines 2 in. apart. At bow and stern ¾-in. screws are used. Another point to keep in mind is that if a screw is not inserted at right angles to the surface of the bottom, the head of the screw will look very unsightly, because one side will sink deeper into the wood than the other.

Again no countersinking of screws is recommended. All screws should be turned in flush with the plywood.

After completing the screwing on of the bottom, all surplus glue is wiped off. Marine glue is somewhat messy to work with, but a little turpentine will clean off the surplus.

The edges of the bottom are next planed off flush with the sides of the boat, likewise the ends of the bottom flush with the transoms. One has to be careful here to have a good sharp plane, and care should be taken not to plane the face side of the plywood.

After sanding smooth the boat is ready to be removed from the form or mold, and turned right side up.

Seats and Trim

At this point it is well to begin work on the center seat. The position of this seat is between ribs 2 and 3 and is made from ¼-in. plywood left over from the sides and bottom.

Two ½ by 1½-in. cleats are fastened to the sides of ribs 2 and 3 at a point 6 in. below the gunwhale or sheer of the boat. Two additional supports from similar material run across the middle of the boat, fastened to the sides of ribs 2 and 3 so as to fit close up against the underside of the seat. These latter supports come in line with the edges of the seat. The cleats and supports are both screwed into the sides of ribs 2 and 3. Total width of center seat is 10¼ in.

After the plywood seat has been fitted it is screwed in place into the edges of cleats and cross supports. Plywood may seem like a light material for a boat seat, but when it is reinforced with those ½ by 1½-in. members as described, it makes a very rigid seat.

Bow and stern seats are each 12 in. wide, and are placed 6 in. down from the gunwhales or sheer of the boat. One cleat is fastened onto the bow as a seat support, and one on each of the sides of the boat. Another support is given by a ½ by 1½-in. strip under the front edge of the seat.

Before finally fastening in the bow and stern seats, the inside of the hull should be painted. The outside of the hull may also be given a prime coat.

Floor boards are simply fastened to the ribs with screws. These run from bow to rib 2, and from stern to rib 3. In this design the floor boards have not been made removable, but that may be done if desired.

The finish trim may now be installed. This consists of a sheer molding at the top edge of the sides, on the outside of the boat. Another piece ½ by 1½ in. is fastened on the inside at the sheer and flush with the top edge of the side. This latter piece not only adds to the appearance, but serves, too, in holding row locks in place. Two chine beads are also installed to cover the top edges of the plywood.

The keel strake is bent over the bottom of the boat at the center, running lengthwise from bow to stern. This should not be screwed on until the boat has been painted.

Rowlocks are placed 24 in. from the stern, and 27 in. from the bow, but these positions may have to be varied a little to suit the length or reach of the individual.

Painting

For a white finish use best quality outside white throughout, the first coat being well thinned with turpentine and linseed oil. Two additional coats of white if well brushed out and given ample time to dry will make a good finish.

Since painting is a slow process when white lead is used, a colored finish may be used as follows.

One coat of quick drying red lead primer.

Three coats of Nalco enamel or similar enamel of synthetic resin base. This primer and enamel will dry in six hours, and allow the painting to proceed day by day without waiting long for drying.

For a natural finish Marine Varnish may be used throughout.

Colors seem to be more popular than natural finishes, and since mixed paints come in such a wide variety of colors it may be well to permit the boys to make their own choice.

Materials for Plywood Pram Dinghy

No. of pcs. required	*Material*	*Size*	*Name*
1 pc.	Spruce or pine	¾ x 8 in. x 8 ft.	Form
1 pc.	Spruce or pine	¾ in. x 3 in. x 10 ft.	Form
1 pc.	Spruce or pine	¾ in. x 17 in. x 8 ft. 6 in.	Form
2 pc.	Douglas Fir Plywood Grade marked Ext. Dfpa.	¼ in. x 48 in. x 8 ft.	Sides, Bottom, Seats
1 pc.	Mahogany or oak	½ in. x 15 in. x 5 ft. 4 in.	Transoms
2 pc.	Mahogany or oak	½ in. x 1¼ in. x 8 ft.	Chines
1 pc.	Spruce or pine	1 in. x 1¾ in. x 4 ft. 6 in.	Bow and stern corner cleats
4 pc.	Spruce	½ in. x 1¾ in. x 3 ft. 3 in.	Ribs
8 pc.	Spruce	½ in. x 1 in. x 1 ft. 4 in.	Ribs
	Plywood Ext. Dfpa.	¼ in. scrap cuttings	Rib braces
1 pc.	Spruce	¾ in. x 3½ in. x 1 ft. 8 in.	Bow floor cleat
1 pc.	Spruce	¾ in. x 2¾ in. x 3 ft. 9 in.	Stern floor cleat
3 pc.	Spruce	½ in. x 1½ in. x 10 ft.	Seat cleats and reinforcements for seats
2 pc.	Spruce	½ in. x 1½ in. x 8 ft.	Inside sheer battens
2 pc.	Oak or mahogany	½ in. x ¾ in. x 8 ft.	Outside sheer moldings
2 pc.	Oak or mahogany	¼ in. x ¾ in. x 8 ft.	Chine beads
1 pc.	Spruce	½ in. x 1½ in. x 8 ft.	Keel strake
8 pc.	Pine	½ in. x 3 in. x 3 ft. 2 in.	Floor boards
8 pc.	Pine	½ in. x 3 in. x 3 ft. 9 in.	Floor boards
2 gross	Screws	No. 4 x ⅝ in. Brass flathead	
6 dozen	Screws	No. 6 x ¾ in. Brass flathead	
12 yd.	White cotton tape	½ in.	
1 pt.	Marine glue		

NOTES FOR ENGINE LATHE OPERATION

GEORGE C. DONSON
High School
Washington, Pa.

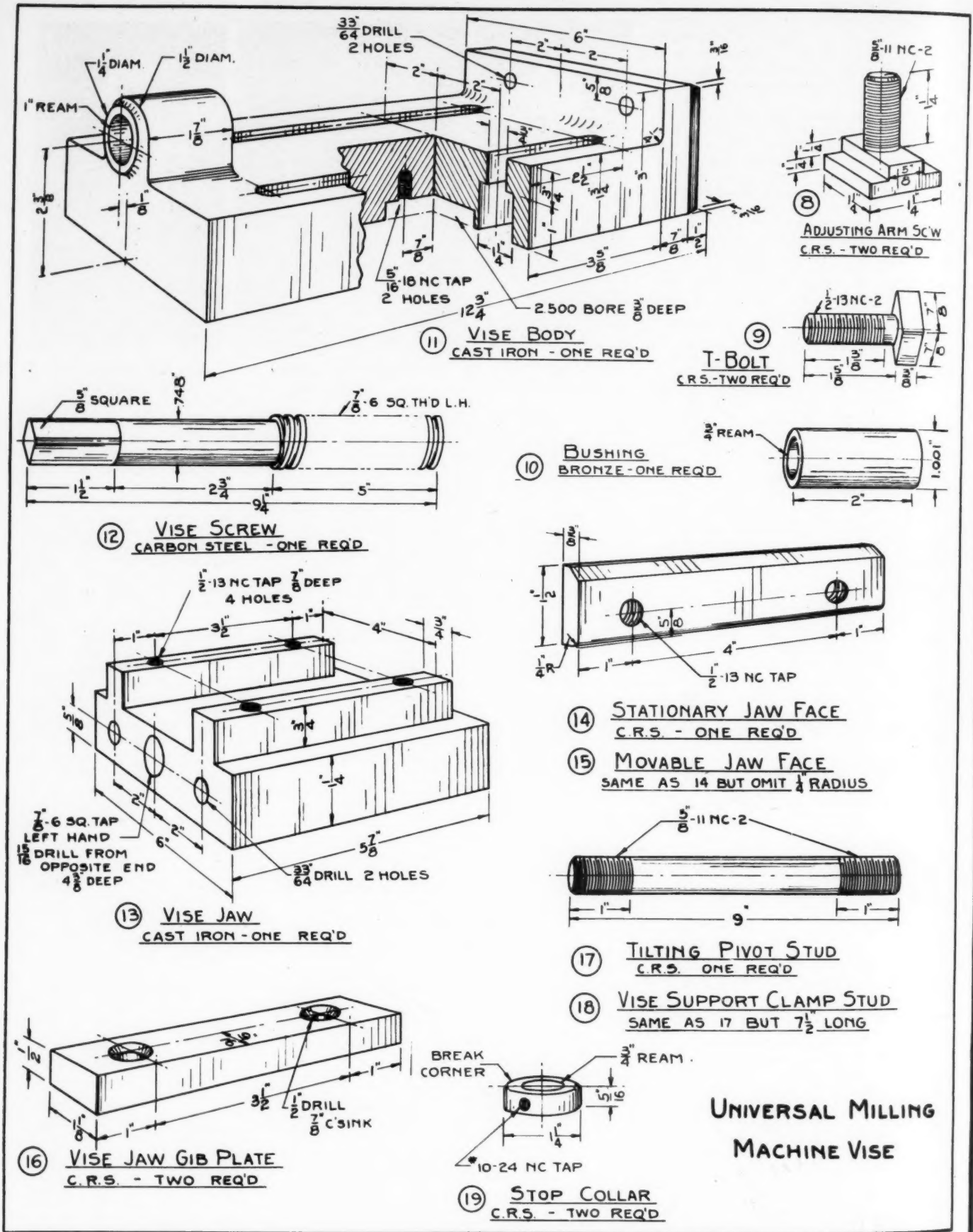
1. Where work is to be finished on the grinder, remember that the lathe is simply to remove stock, and not to produce a finish. Use the coarse feed to reduce the stock to the grinding limit.

2. If you are bothered with chattering when turning or boring, try turning the tool upside down, and run the lathe backward. This forces the spindle to seat in its bearings and will often prevent chatter.

3. An indicator, of the dial variety, is an extremely handy tool around the engine lathe, particularly if accurate work is to be done. Get accustomed to using it if you wish to become an accurate workman.

4. When sharpening a broad flat chisel for finish turning on wood for patterns, leave the

(Turn to Engine Lathe Operation, page 219)



Universal milling machine vise details by William A. DeVette, Instructor, Technical High School, Erie, Pa.
(For assembly and other details see pages 168 and 169 of the April, 1942, issue)

METRIC and ENGLISH

METRIC and ENGLISH

CONVENIENT MULTIPLIERS

	—GIVEN—	—TO FIND—	—MULTIPLY BY—	—GIVEN—	—TO FIND—	—MULTIPLY BY—	
—LENGTH—	Inches	Centimeters	2.54	Kilometers	Miles	.621	—LENGTH—
	Feet	Centimeters	30.48	Kilometers	Yards	1093,631093.63	
	Yards	Centimeters	91.44	Kilometers	Feet	3280.830	
	Miles	Centimeters	160,934.4	Kilometers	Inches	39369.96	
	Inches	Meters	.0254	Meters	Miles	.000621	
	Feet	Meters	.3048	Meters	Yards	1.094	
	Yards	Meters	.9144	Meters	Feet	3.281	
	Miles	Meters	1,609.344	Meters	Inches	39.37	
	Inches	Kilometers	.0000254	Centimeters	Miles	.00000621	
	Feet	Kilometers	.0003048	Centimeters	Yards	.010936	
	Yards	Kilometers	.0009144	Centimeters	Feet	.03281	
	Miles	Kilometers	1.609344	Centimeters	Inches	.3937	
—WEIGHT—	Ounces	Grams	28.4	Kilograms	Pounds	2.2046	—WEIGHT—
	Pounds	Grams	454.4	Kilograms	Ounces	35.3	
	Grams	Ounces	.035	Ounces	Kilograms	.0283	
	Grams	Pounds	.0022	Pounds	Kilograms	.4535	
	Kilograms	Grams	1,000.	Grams	Kilograms	.001	
—VOLUME—	Cu. Ft.	Cu. In.	1,728.	Cu. Meters	Cu. Cm.	1,000,000.	—VOLUME—
	Cu. Yd.	Cu. Ft.	27.	Cu. Cm.	Cu. Meters	.000001	
	Cu. Yd.	Cu. In.	46,656.	Liters	Cu. Meters	.001	
	Cu. In.	Cu. Yd.	.00002143	Cu. Cm.	Liters	.001	
	Cu. Ft.	Cu. Yd.	.03704	Liters	Quarts	1.06	
	Cu. In.	Cu. Ft.	.000578	Quarts	Liters	.943	
	Gallons	Cu. In.	231.	Liters	Gallons	.2642	
	Quarts	Cu. In.	57.75	Liters	Cu. In.	61.022	
	Cu. In.	Gallons	.00433	Cu. In.	Liters	.01638	
	Cu. In.	Quarts	.00108	Gallons	Liters	3.785	
	Liters	Cu. Cm.	1,000.	Cu. In.	Cu. Cm.	16.387	
	Cu. Meters	Liters	1,000.	Cu. Cm.	Cu. In.	.061	

Submitted by Curtis Tracy, Senior High School, Bradford, Pa.

ENGINE LATHE OPERATION

(Continued from page 214)

wire edge on, and do the final stropping on a leather block so that the wire edge is turned upwards. A chisel so sharpened will give a much finer finish than one on which the wire edge has been removed.

5. Universal lathe chucks are very convenient in the shop but they can rarely be depended on to run true if accuracy is desired. They may be good enough for a large proportion of the work to be done, but accurate work demands separate adjustment of the jaws.

6. Before complaining that the lathe is not in line, be sure that the bed is carefully leveled up. Don't twist the lathe bed out of shape by pulling it down onto an uneven floor with lag screws, and then expect it to turn straight.

7. Squared ends and a uniform depth of lathe center are desirable for accurate and economical work. Don't make the mistake of thinking that any boy can do the centering well enough without proper instruction and supervision.

8. A little square of mica with a tin rim makes a good chip guard when turning brass. A simple wire spring clip can be used to fasten it to or detach it from the tool or tool post.

9. Grinding in the lathe is not a good practice unless it is absolutely necessary. Don't forget that the abrasive is just as willing to cut on the lathe shears as anywhere else.

10. If a 1/32-in. slot is cut on the top of the tail center running from the point back to a little beyond the large part of the conical end, the center can be oiled without slacking it back. This is better than grinding half the conical end away.

11. After rough-turning carbon steel stock for taps, reamers, etc., heat it to a dull red and allow it to drop on end on an anvil or block of iron. This seems to relieve the stress so that after finish-turning and machining the piece is not so likely to warp in hardening.

12. The side tool with plenty of rake is the easiest cutting tool for the lathe. The round- or hog-nosed tool will stand more punishment and require less attention in grinding. The lathe centers should be well cared for and the point ground in place if possible and always put into place in the same position. Don't make the mistake of using a lathe center for a hammer or a punch, or spoil the accuracy of a center by applying unnecessary pressure on the hand wheel.

13. Remember that in cutting threads, if the thread to be cut is finer or coarser than that of the lead screw, the split nut must be engaged at the sign of the dial for even and odd threads. Any thread which is a multiple of that of the lead screw may be cut by engaging the split nut at any place.

14. In testing a lathe for straightness, remember that it cannot turn a piece uniform in diameter if the work can spring away from the cutting tool bit.

15. For turning copper set the tool at an angle of 30 deg. Milk makes a good compound for cutting copper.

16. Before starting work on a lathe with which you are not familiar it is wise to slide the tailstock back and move the carriage to the center of the bed, then with no work between the centers, start up the lathe and put it through its various movements.

17. Don't forget that a little dirt will throw a lathe center out of true and impair the quality of the work. In turning taper work always consider the whole length of the work or the distance between centers in estimating the offset for the tailstock. Make the offset half the amount of the total taper. This means half the difference between the diameter of the large end and the small end if the taper extends the whole length of the piece of work.

18. Always set the cutting tool at the height of the lathe center in turning taper work. If it is above or below the center it will turn a different taper with every cut. In cutting threads on taper work, set the tool square with the center of the work. Don't make the mistake of setting it square with the tapered portion.

INCENDIARY-BOMB MODEL

R. R. BEDKER
High School
Wauwatosa, Wis.

The illustrations shown herewith present the interior construction of the magnesium-thermite incendiary bomb, and a detailed drawing of a demonstration model of such a bomb.

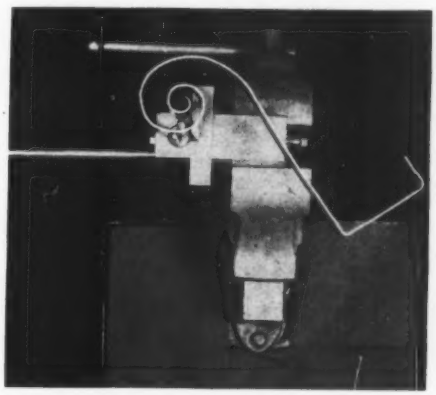
A number of these models were made by the author's students for use in the training of civilian-defense workers of various types.

The need for learning how to fight fires resulting from air attacks, and how to extinguish incendiary bombs before they do much damage, becomes apparent when one considers that one bomber can unload 2000 of these bombs on each trip. It is necessary, then, to be prepared if and when such air attacks are made.

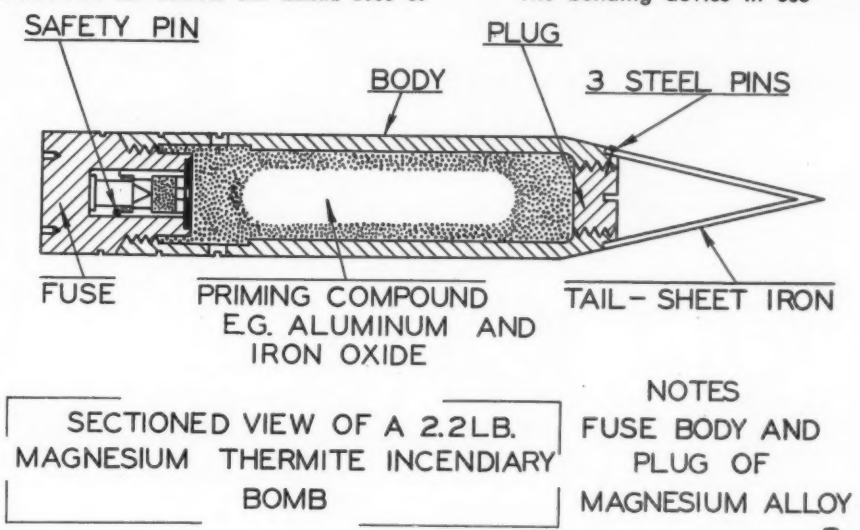
BENDING DEVICE

GUY I. SMITH
FRANK A. COLLINS
Burgard Vocational High School
Buffalo, N. Y.

The forming of perfect bends in art-metal work is a problem that constantly confronts the student. Making a scroll or curve by means of hand pliers, stationary pins in a block, or hammering over an anvil is difficult because the student lacks the practiced eye



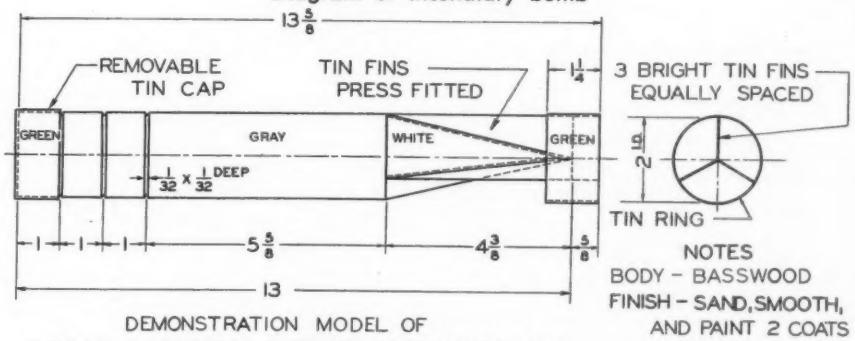
The bending device in use



SECTIONED VIEW OF A 2.2 LB. MAGNESIUM THERMITE INCENDIARY BOMB

NOTES
FUSE BODY AND PLUG OF MAGNESIUM ALLOY
PW

Diagram of incendiary bomb



DEMONSTRATION MODEL OF A 2.2 LB. MAGNESIUM THERMITE INCENDIARY BOMB

NOTES
BODY - BASSWOOD
FINISH - SAND, SMOOTH, AND PAINT 2 COATS AS INDICATED. PW

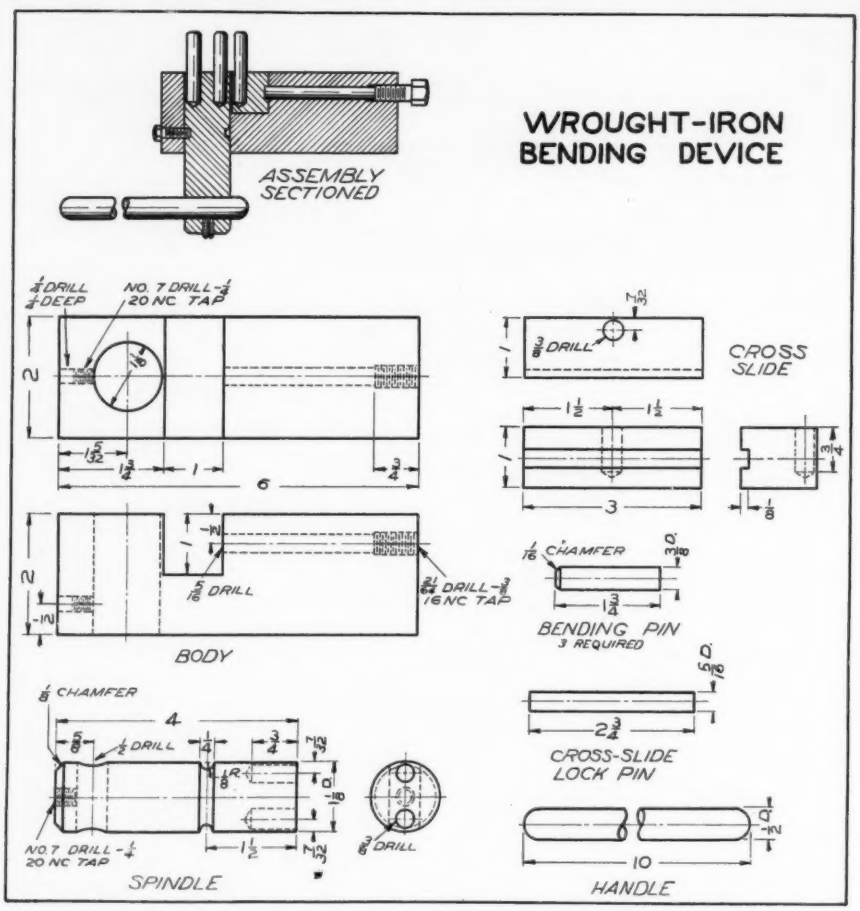
and the experience necessary to control the curve by these methods. The simple device illustrated herewith is easy to make and provides a good method for bending band iron or other metal strips up to ⅛ in. thick by 1 in. wide. It will bend stock from a minimum radius of 3/16 in. up to almost any radius required in industrial-arts work. It is not limited, however, to plain radii for with a little manipulation, which will develop with practice, irregular curves, scrolls, and other intricate shapes can be formed. If a wrong bend is made or if the student is dissatisfied with the scroll produced, he can, by reversing the process, remove the curve and restore the metal to its original shape and begin his project over again without loss of material. One of the best features of this tool is that it is so designed that strips ranging from several inches to several feet in length can be bent with equal ease and accuracy. The halftone illustrates an irregular scroll and a 90-deg. bend in a 20-in. strip of metal.

The body is made of cold-rolled steel or of cast iron, with a slot milled into it 1¾ in. from the front end. Into this slot is fitted a slide, also of cold-rolled steel, which has a pin of drill rod steel forced into it at a point midway between the ends and 7/32 in. from the front edge. The spindle is made of cold-rolled steel and has two pins of drill-rod steel fitted into the top. These pins are of the same dimensions as the pin in the slide but unlike it they are made with a sliding fit and are easily removable. A groove must be turned in the spindle to receive a 3/16-in. setscrew which is to prevent the spindle from falling out. Likewise, a setscrew is used to tighten the slide and hold it in the proper place. The handle, either of cold-rolled steel or any other high-grade steel, should have a sliding fit in the spindle.

The use of this bending device is very simple. It is gripped firmly in a vise and the stock is placed between the two pins in the spindle and rested against the stationary pin in the slide as shown in the halftone. The handle is then given short, sharp jerks while the stock is fed through until the required bend is made. By regulating the moving of the stock while the handle is being worked, bends of large or small radii can easily be made. It will be found that short, sharp jerks of the handle will result in smoother and better bends than can be accomplished by placing a lot of strain on the handle.

The slide, which serves to support the work and keep it level while bending, is movable and can be shifted to the right or left for larger bends. If bends of smaller than 3/16-in. radius are desired, there is space in the top of the spindle where pins of smaller than 3/16-in. diameter can be fitted in. These are not included in the working drawings shown, but the spindle is removable and this change can be easily made at any time. If it is found desirable to have a larger bending device to handle heavier or wider material, the dimensions given in the working drawings may be increased in proportion.

It will be found after a little practice that much time and labor will be saved and that a better grade of work can be turned out with this tool than by any other method. It has been very successfully used at Burgard Vocational High School.



Details of wrought-iron bending device

EASY METHOD OF REMOVING PAINT OR VARNISH

WAYNE M. JUDY
Director of Vocational Education
International Falls, Minn.

By far the most disagreeable part of refinishing furniture or old woodwork, is the removing of the old finish. This chore, however, can be made easy and enjoyable if one adheres to the following directions:

The author demonstrates the method and displays the necessary materials for successfully removing an old finish

First cover an area equal to about one square foot with any standard grade of varnish remover. Allow this to dry for about one and one half minutes and then wash the old finish away with medium coarse steel wool which has been saturated with denatured alcohol.

One will find that unless there are deep blemishes in the wood that this method leaves the surface ready for the new finish and that little or no sandpapering is necessary. This method is especially desirable when refinishing turned or carved work. It will work very much more satisfactorily than the scraping method which is usually recommended.

TYPICAL INSTRUCTION SHEET FOR NATIONAL DEFENSE ARC-WELDING CLASS

EARL L. BEDELL
Director of Vocational Education
HAROLD SHOUP
Detroit, Mich.

Butt Welding

Reason for the Job: To help one learn the techniques of arc butt welding two ¼-in. steel plates together.

Safety: The welder must never look at an arc without using a protective glass screen

and must determine that others near him are also protected from the rays of the arc. The welder should have a loose-fitting jacket proofed against the effect of sparks, gloves made of asbestos with wide gauntlets to protect the wrists, an apron of thick leather which resists heat, shoes that lace well above the ankles, and trousers without cuffs.

Materials: Two pieces ¼ by 2 by 6-in. mild steel; 4 pieces 5/32-in. bore; mild-steel electrodes.

Equipment: One arc-welding machine, 1 welding bench, 2 firebricks, 1 arc booth.

Tools: One steel wire scratchbrush for removing scale, dirt, and slag from the work; 1 steel scriber; 1 prick punch; 1 machinist's hammer; 1 flat chisel; 1 flat bastard file; 1 measuring tape; 1 folding rule.

Procedure:

1. Get the tools and supplies from the tool crib.
2. Place the two plates on the table top with a ⅛-in. space between their longest edges.

a) The pieces must be well grounded to the table.

3. Tack weld them at both ends.
4. Start at one end and lay a straight bead along the joint.

a) Hold the electrode perpendicular to the plates. See Figure 1.

Position of Electrode of Butt Weld in Flat Position

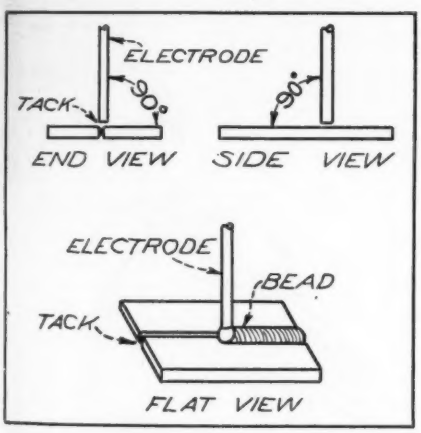


Fig. 1

b) Use straight polarity on a d.c. machine.

5. A slight side-to-side motion of the arc will slow up the progress along the line of weld, will build up the bead flush with the top surfaces of the plates and at the same time penetrate through to the bottom of the plates.

a) Be sure to distribute the heat evenly between the two plates.

6. The finished bead should be at least ¼ in. wide if proper penetration has been obtained. See Figure 2.

a) This type of weld, without vee, is used on plates ¼ in. or less in thickness.

7. Inspect the job and have the instructor mark the last of several practice exercises.
8. Clean the station and turn in all the tools and supplies.

Reference: The Welding Encyclopedia.

Questions:

1. What is the ammeter reading for ¼-in. steel plate?
2. What polarity should be used if a d.c. generator is used?
3. Where should the plates be placed? Should the plates have any spacing between them?
4. Should the plates be tack welded? How?
5. In what position should the electrode be held in respect to the plates being welded?
6. Where should the weld be started?
7. What motion, if any, should be used? Why?
8. How should the heat be distributed between the two plates?
9. What appearance should the finished bead have if the weld has the proper penetration?
10. What is the maximum thickness of plates that can be used without veeing the edges?

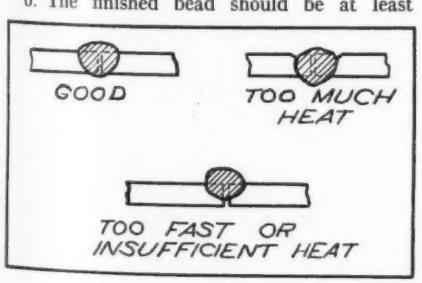


Fig. 2

A ONE-PIECE MAILBOX

E. LE ROY LONGLEY
Baltimore, Md.

A mailbox is nothing unusual as a project, but this is an unusual mailbox, and so should be interesting.

In general, mailboxes are complicated, consisting as they do of a number of pieces of material. The one described herewith is made of only one 14 by 7½-in. piece of metal. The job, therefore, is simple enough for the average eighth-grade boy. The most difficult part is in the cutting of the slot, which is punched with a hollow punch at the ends, and then completed between holes with a cold chisel or a jeweler's saw. The rest of the cutting is easy and the forming not difficult. Soldering, of course, is the usual procedure in closing edges or seams. The box also allows the student to do independent designing for the top and bottom flaps.

Before making the mailbox, be sure to determine where the box is to be used and to form it right or left handed as needed.

In order to relieve the plain front, the word mail, or an initial or monogram may be painted on. This ornamentation also may be sawed out of another metal and soldered on.

Material: 1 pc., 14 by 7½-in. IXX tin plate, or No. 24 galvanized iron. It may also be made of 24-oz. hard or of 20-gauge half hard brass.

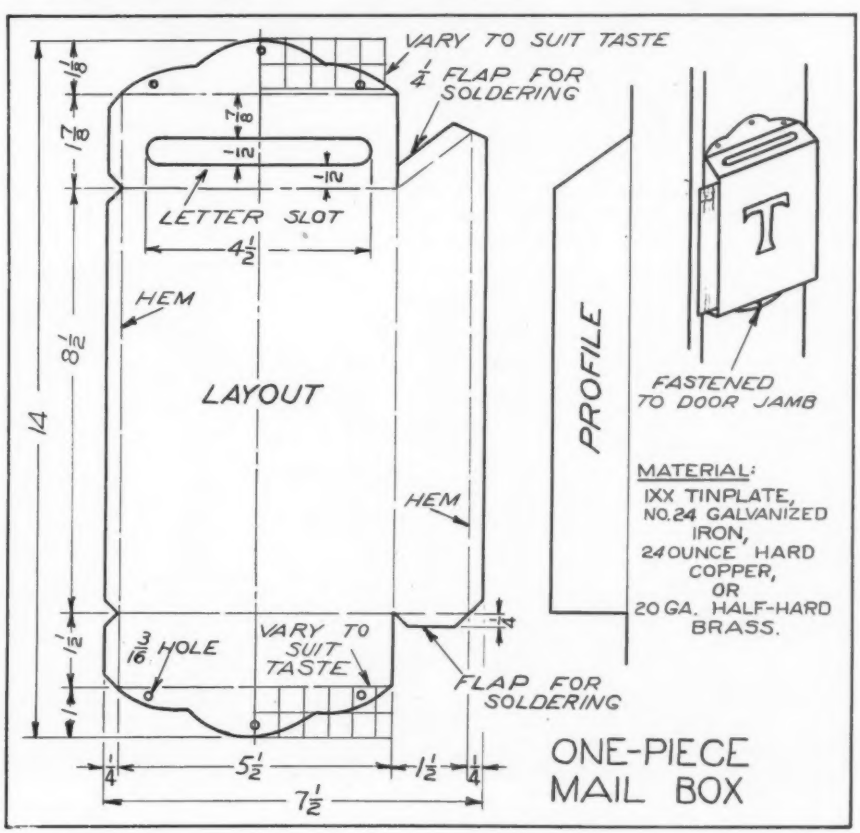
Procedure: Mark and cut out the pattern from material, punching holes for hanging, with No. 6 solid punch. Make letter slot with hollow punch and chisel. Flatten edges with mallet and smooth with file and emery cloth.

Hem the edges, and then form the box on brake and stakes. Make the box either right or left handed according to the door.

Paint or finish as desired.

This mailbox is attached to the door jam with small screws at such a height that the mail may be removed conveniently. When the door is closed, this box is open only to the mailman who uses the slot in the top for the mail. It drops to safety within the box, to be accessible only to the person within the house when he or she opens the door.

A sheet metal or wire rack may be attached to the lower end of the box for papers and magazines.



Whittling-Jackknife Technique

W. BEN HUNT
Hales Corner, Wis.

(Continued from page 180 of the April, 1942, issue)

Ornamental Brooches

By this time, those who have followed this series of whittling projects will be quite adept at handling a pocketknife. They have learned how to sharpen a knife, and that the knife must be sharp at all times. This means that frequent honings are necessary as one goes along. They have also learned that it is possible to cut, not only across the grain, but also against the grain of the wood. This frequently is quite necessary, but it can only be done with a very sharp knife. However, it is not good policy to cut against the grain when a cut with the grain is possible.

Any one of the three attractive pins shown in Figure 70 can be made in an evening. The cuts in Figure 71 are full size; hence, they may be traced off and transferred to the wood with carbon paper. Up to this time, a softwood has been advocated. It can be used for these pins also if so desired. If some harder wood, such as red cedar, cherry, gumwood, or mahogany is used, however, it will make a nicer, smoother job, since the pins are to be finished in the natural wood, or with probably a little stain to bring out the quality of the wood.

Hardwood is, of course, better than softwood, because it is not so likely to split, and it takes a finish better. The wood should be ¼ or 5/16 in. thick. After the outline has been transferred to the wood, cut it out with a coping, jewelers', or power jig saw. Study the halftones and the drawings. Remember that only one half of the animal is made; that means that all edges are rounded off. In other words, the finished job will not show any sign of the saw cuts, with the exception of the bottom of the hoofs or feet of the deer. The slant cut across the bottom of the horsehead pin also shows how the edges are rounded off. Finish with fine sandpaper.

Fig. 70. These brooches were made of some very old cherrywood which had become quite dark with age. They were finished with wax only

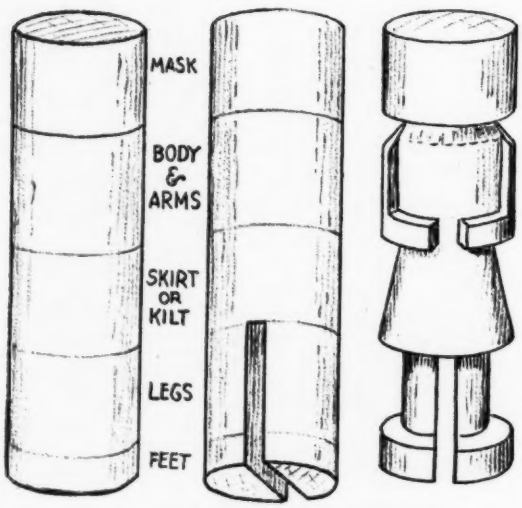


Fig. 72. Katcina-doll proportions

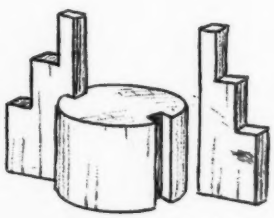


Fig. 73

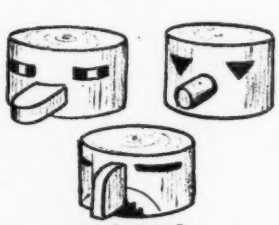


Fig. 74

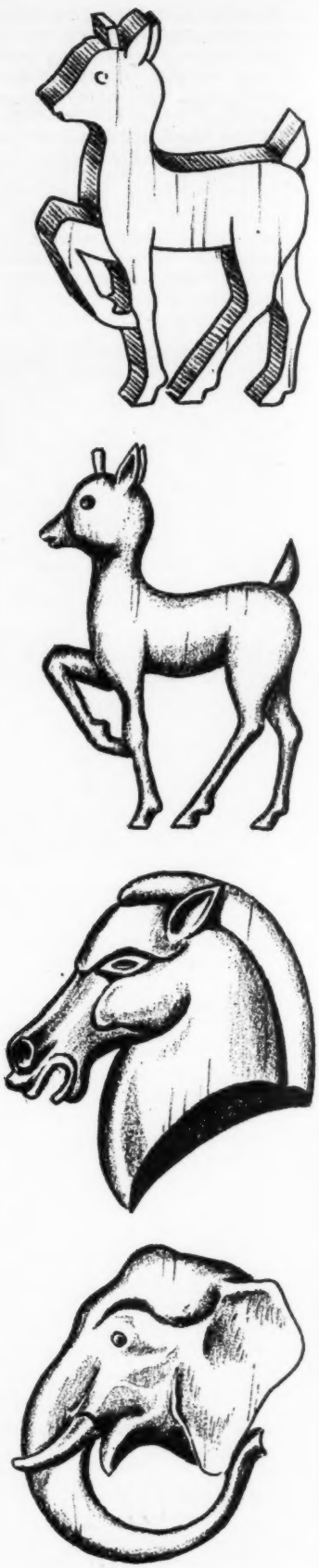


Fig. 71. Full-size patterns for brooches

Fig. 75. Directions for painting katcina dolls

Safety pins are then fastened to the backs. Then give the face a few coats of furniture wax and then polish, or perhaps a coat or two of varnish, shellac, nail polish, or clear lacquer. The author usually uses wax and a good polishing on a felt or muslin polishing wheel.

When mahogany is used, a coat of filler is necessary as the pores are quite noticeable on such small objects.

Katcina Dolls

It may not be amiss, at this stage, to take up a little Indian lore about katcina dolls, and whittle out a few of them.

These katcina dolls are images made to represent the mythical spirit people of the Hopi Indians believed to inhabit San Francisco mountain. According to the Indians,

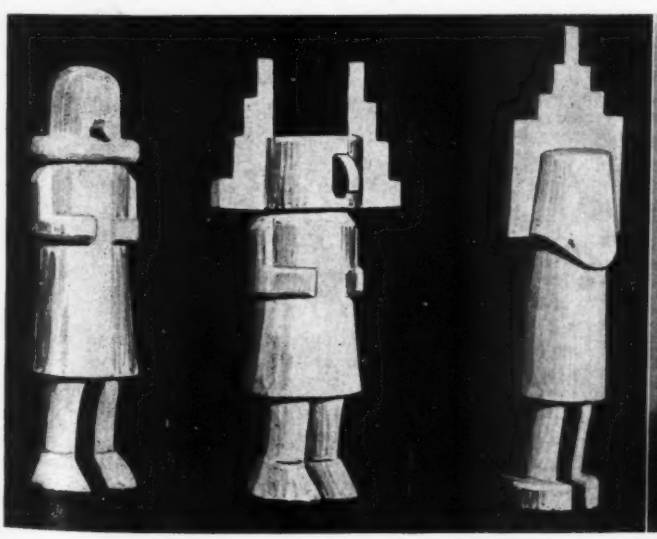


Fig. 77. Ready for the paint and feathers

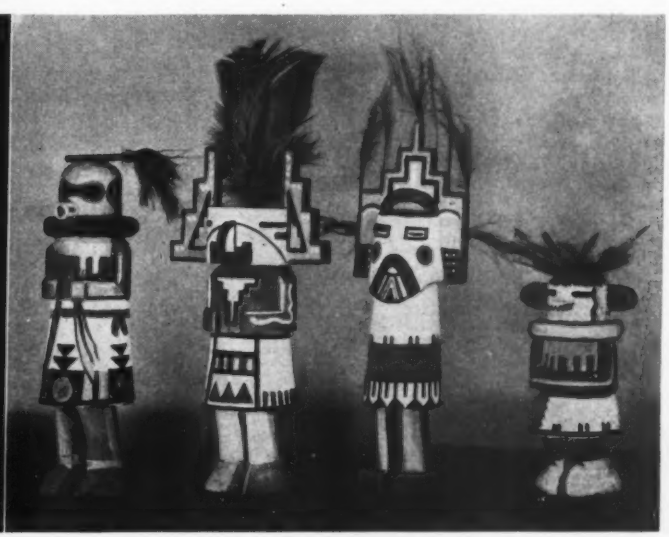


Fig. 78. All painted up

these spirits visit the Pueblos at certain seasons. The katcina dolls are made by the Hopi men and are presented to the little girls at the various katcina ceremonies. There are more than 300 different katcinas.

Any of the softwoods may be used for whittling these dolls. The Hopis usually use cottonwood roots, but the grain is quite rough and stringy, and they are more difficult to paint than regular softwood. Some of the older dolls were dressed in buckskin, or cloth skirts. Of late years, however, the only decoration besides paint are feathers. Figure 78 shows four finished katcina dolls. These were painted with water colors.

Figure 72 shows how the wood is marked off, the saw cut, and the finished whittling of one type of doll. No faces are whittled as most of the katcina dancers whom these dolls represent, wore masks. Figure 73 shows how the ornamental top panels at the side of the masks are set in and glued. The noses shown in Figure 74 are also set into mortises in the same way. Figure 75 shows that not all masks have noses. In Figure 75 several characteristic masks of the more ornamental type are shown. Notice how cleverly the features are shown by using symbolic figures and just a few lines. Some of the dolls are decorated with feathers, others are not. In Figure 76 are shown three styles of legs and two different kinds of feet. The legs in the upper left-hand corner are whittled without the saw cut. Also note that one of the dolls in Figures 77 and 78 has a different mask and no arms.

Any of the masks may be used on any of the bodies and the same holds true with the feet and legs. It is not the aim here to describe ethnologically correct katcina dolls, but rather something pleasing to the eye. The nicest proportion for these dolls is 1½ in. in diameter by 3½ in. high. These dimensions may be changed to suit individual tastes, however. Some of them are made as large as 3 in. in diameter by 12 in. high. The legs, too, may be made longer or shorter and likewise the skirt. Study the key for the colors shown in Figure 75, and it is well also to look at the katcina dolls when visiting a museum.

These interesting little figures are well worth the time it takes to make them. Even children can whittle them out, and at camps they make fine handicraft projects which can be produced at little cost. A few 10-cent jars of poster color will decorate a lot of dolls, and feathers can be found wherever there are chickens, pigeons, ducks, or geese. Only the small feathers should be used. Figure 79 shows some of the symbolic figures that may be used in decorating these katcina dolls.

Fig. 79. Indian symbols

Fig. 76. For color key see Fig. 75.

THE "OTHER" GUY

Leonard E. Schmidt*

As you walk along life's highway,
Do you ever stop and try
To see if you can lend a hand
To help — the "other" guy?

Have you tried to ease his burden?
Or, perhaps, relieve a sigh?
Or do you find it easy
To forget — the "other" guy?

A cheery smile, a friendly pat,
Will make you rate "ace high"
And you'll appear the grandest friend
To — the "other" guy.

And don't forget, in all you do,
Or say, or think, or try,
That to everyone, except yourself,
You're the "other" guy.

*Lincoln Hall, Bronx Vocational School, Lincolndale, N. Y.

MAGNIFIED SCALE FOR PLANERS, SURFACERS, AND OTHER MACHINES

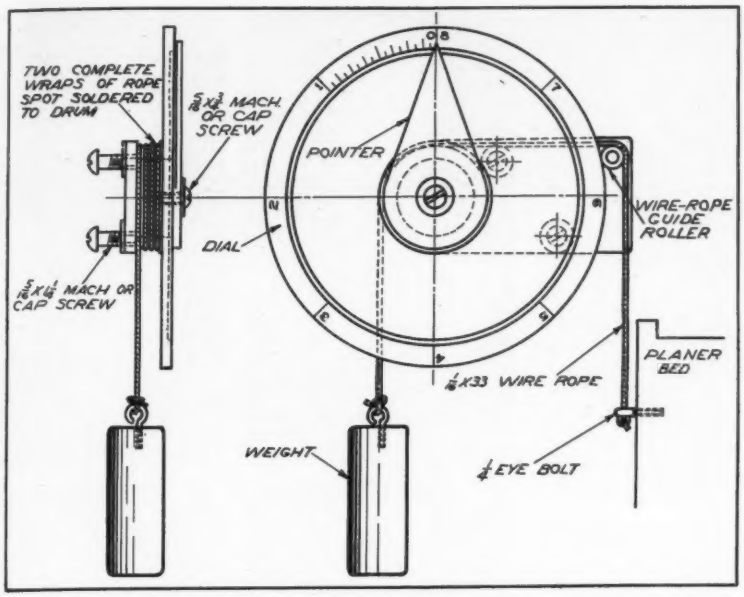
HUGH HUMPHREYS
Cincinnati, Ohio

This device magnifies the actual scale over three times, and graduations on the dial may be made 1/16, 1/32, 1/64, or even 1/100 in. if desired. The project is very simple in construction as there are very few and simple pattern parts. It is composed of a backplate, wire-rope roller, dial, piece of wire rope, a weight, and a pointer.

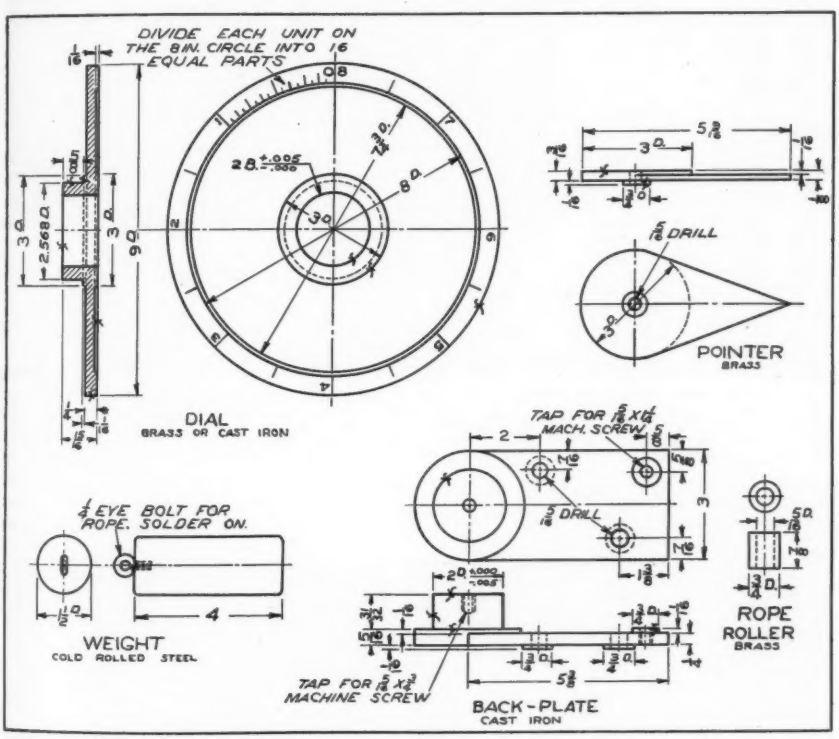
With this device on a planer or surfacer, the machine may be set to a given size without taking fine-scale readings.

Installing to a Machine

The backplate is attached to the frame or stationary part of the machine and the eye-bolt with the wire rope is attached to the moving or adjustable part of the machine. It will be found in attaching to some machines that it is necessary to make a bracket for the stationary part of the machine to bring the


TWO COMPLETE WRAPS OF ROPE SPOT SOLDERED TO DRUM
5/16 X 1 3/4 MACH. OR CAP SCREW
POINTER
WIRE-ROPE GUIDE ROLLER
DIAL
5/16 X 1 1/4 MACH OR CAP SCREW
1/4 X 33 WIRE ROPE
PLANER BED
WEIGHT
1/4 EYE BOLT

Assembly of magnified scale for planer



Details of magnified scale

scale in such position that it will work freely with the moving part of the machine.

Bill of Materials

1 Backplate — cast iron
1 Wire-rope roller — brass
1 Dial — cast iron or brass
1 Weight — cold-rolled steel or machine steel
1 Pointer — brass
3 5/16 by ¾-in. machine screws
1 5/16 by 1¼-in. machine screw
2 ¼ by ¾ eyebolts, ¾-in. diameter, ¾-in. screw length
1 1/16 by 33-in. wire rope

THE DAILY ROLL CALL

GEORGE W. SCHNEIDER
Union High School
El Monte, Calif.

In order to give the students a maximum of working time in the shop, it is necessary to take roll call in an efficient manner. Numbers stenciled on the floor are a distinct aid. When the boys come into the shop they stand at their numbers, and it is necessary to check only the empty places.

This solves many discipline problems. Playing with machines, scuffling, and other minor nuisances are avoided. It does occur, but the teacher has but to ask, "Why aren't you on your number?"

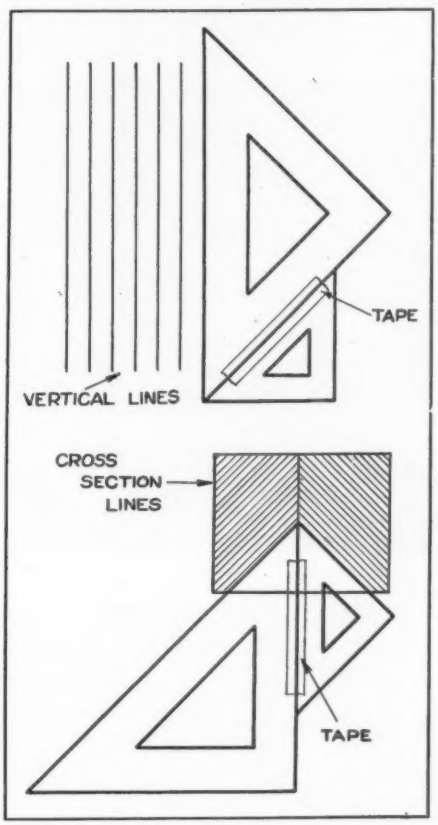
When the boys find out, "No line-up — no work," loafing becomes very unpopular. The boys are anxious to work and like the efficiency.

Use 4-in. numbers, 24 in. apart. Don't crowd the boys, and use two sides of your room.

A DRAFTING JIG

PAUL CRESSMAN, JR.
State Teachers College
California, Pa.

When a number of long vertical lines must be drawn, attach a pair of 45-deg. triangles together with scotch cellulose tape. Place the hypotenuse of the small triangle against the leg of the large one and then apply the tape



Drafting jig

on both sides. The tape is strong and transparent and will not interfere with the use of the instruments. With the leg of the small triangle against the T square, long vertical lines may be drawn without shifting the triangles.

This device is also useful when drawing diagonal lines in cross-section drawings. By placing the leg of the large triangle against the T square, it is possible to draw diagonals in either direction without turning the triangles. It is possible to perform all of the normal operations with the triangles without taking them apart.

THE ART OF MOLDING

L. M. RIGELMAN
Augusta, Mich.

Flexible Molds for Statues in the Round

In two previous issues of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION (September, 1938, page 284, and December, 1939, page 415), preliminary steps to the following process have been described. One might prepare himself more adequately to start the method here described if he were to review the initial contents of those articles. They dealt specifically with the solid piece mold, and the flexible mold for flat surfaces, such as wall plaques, mottos, etc., and form a very clear elementary study for this more complicated bit of endeavor.

In this article we are to deal with the flexible mold for ornaments in the round; that is, showing all sides. To this end we have selected a familiar bust of Lincoln for our study. See Figure 1. While we selected only one particular type of statue for our step-by-step description, there is practically no limit to the scope of work one might accomplish

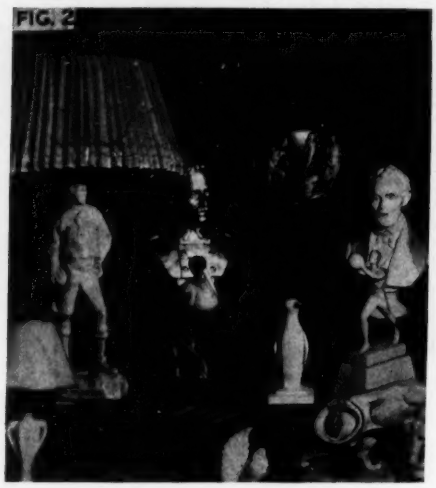


FIG. 2

Any type of ornament may be reproduced by this method

by this method. Figure 2 shows a number of projects made in molds of this kind. The only limit to casting these articles is that they must have sufficient girth to accommodate the type of material used. For instance, a very spindly metal piece would not be an appropriate model to be reproduced in plaster composition, since the plaster would require greater bulk to *hold up* its structure. However, remembering this exception, one may select from a large variety of statues for experimenting with this type of mold. Clay models or wood patterns of ornaments may also be reproduced by this process.

Material

The amount of material needed depends entirely on the size of the statue to be reproduced.

1. Clay or plasticene*	3 or 4 pounds
2. Good grade of gelatine glue	4 pounds
3. Plaster of Paris (molding statuary plaster)	
4. Alum	2 ounces
5. Powdered chalk	a few ounces
6. Stearine solution	

*Molding clay which does not harden.

The stearine solution is prepared by dissolving stearine in kerosene oil to a creamy consistency.

There should also be at hand pans, knives, mixing paddles, and the like. Discarded utensils found around the house may be used if they are clean and free from rust particles.

The Step-by-Step Process

Cover the statue to be reproduced with tissue or oiled paper to protect the finish. See Figure 3. Then, after kneeding the clay until it is very pliable, cover the statue to about the thickness of ½ in., as shown in Figure 4. Do not cover the bottom. Next smooth the clay gently over all parts as shown in Figure 5.

Then fence off the clay covered model into two parts — a front and a back — with a strip of clay, as shown in Figure 6. Now place freshly mixed plaster of Paris, with a throwing motion, on the front half of the model to the thickness of nearly 1½ in. See Figure 7.

To mix the plaster of Paris, first estimate the amount of water needed and place in the mixing dish. Then slowly sift the plaster into the water until an island appears on the surface and remains there. This is the clue that there has been sufficient amount of dry plaster added to make a good mix. This done, stir frequently until the mass reaches the desired consistency.

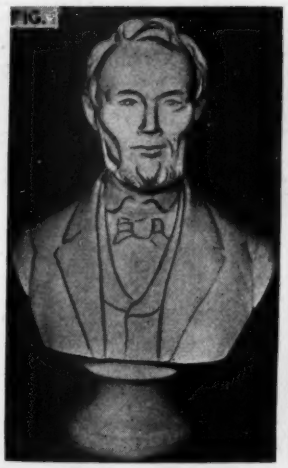


FIG. 1

FIG. 3

FIG. 4

FIG. 5

1. The original to be reproduced
3. Wrap the statue with tissue paper
4. Cover with clay
5. Gently smooth the clay with the fingers

After the front half has been covered, and the plaster has hardened sufficiently, peel off the clay strip used to divide the shell, and proceed to cover the back half of the model. First, however, scoop a small indentation into the rim of the shell with a common table knife, as shown in Figure 8. These shallow holes serve as dowels to keep the half shells in place. After greasing the rim of the newly made shell with the stearine solution, proceed to cover the back half with plaster in the same way as was done with the front. See Figure 9.

When the shell has become sufficiently hardened, bind the two halves together with a rope as shown in Figure 11. Then proceed to cover the entire bottom. Do not forget

FIG. 12

This is the completed shell

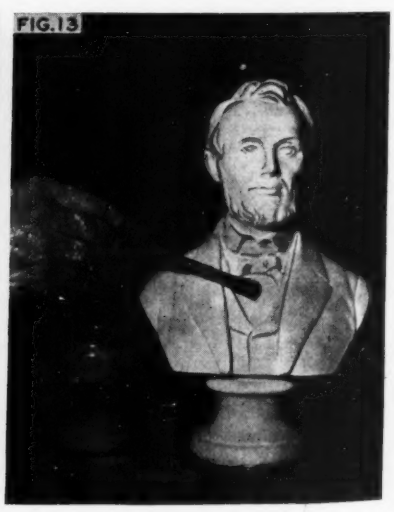


FIG. 13

Greasing the model

6. Fence off a front and back
7. Cover front with plaster
8. Produce dowel depressions in the shell rim
9. Cover back with plaster
10. Cover back and front shells
11. Make a bottom shell

to make dowel sockets in the bottom rim and in the bottom of the model itself.

After the plaster has set the shell may be taken apart. The clay is then peeled off of the original model, as in Figure 12, and laid aside for future use.

You now have a shell which is approximately ½ in. larger than the statue. See Figure 12. Into this space is to be poured the melted glue. With this in mind, make a hole through the top of the shell, and cut air channels where air is most likely to form. These channels are shown in Figure 15.

When the shell is completely dry, grease the inside and the rims with stearine solution. Then grease well the original model, as shown in Figure 13. Place the model on the bottom part of the shell, and reassemble the parts of the mold as in Figure 12. Now bind the whole together with rope, as shown in Figure 14, and proceed to pour in the glue as described in the December, 1939, issue. Flexible molds are made of various substances, such as glue, rubber, synthetic materials, and the like. Their method of application differs. Some of the molds are made by spraying, others by dipping, brushing, or pouring, depending upon the type of material used. In

Reassemble shells over statue and pour in the glue

The jellied mold

FIG. 16

Cut at dividing line

FIG. 17

Place into original shell

these instructions, however, we will use gelatine glue as the mold substance. Except for performance, glue has most of the qualities of these other flexible mold materials, and is more reasonable in price. By careful usage glue can be used over and over again, and the cost of molds kept down to a few cents each. To prepare the glue for the mold, first estimate the amount needed. Then place the glue in the inner container of a double boiler and cover with warm water. It is well to let it soak overnight, but this is not absolutely necessary.

Then melt the glue in the double boiler over a slow heat. Be careful that it is not overheated. When all of the glue has melted, let it cool evenly by frequent stirring until it is merely warm to the touch. At this stage it should be the thickness of heavy molasses. Then pour slowly into the top opening of the shell as shown in Figure 14.

It is well to build a funnel out of clay plaster at the top opening, to facilitate pouring and to accommodate the shrinkage of the cooling glue. Fill with glue to the top of the funnel and let cool without disturbance for 3 to 4 hours, depending upon the temperature of the room. A cool basement is a most suitable place for making a mold of this kind. Figure 15 shows how the glue cools into a tough rubberlike mold.

The shells may then be taken apart, after which the glue mold must be carefully cut apart at the dividing lines as shown in Figure 16. *Caution!* Be careful not to cut into the original model. As soon as the mold has been cut apart, place the halves back into their respective shells to hold their forms, as shown in Figure 17. Then set the molds aside to dry for several minutes.

It must be remembered that setting plaster generates heat, and that glue has a low melting point. In order to keep the mold from melting, then, during the casting process, steps must be taken to harden the glue to resist the heat of the setting plaster. To do this, first dust out the newly made mold with powdered chalk, using a soft bristled brush; this is to absorb the grease which adheres to the inner surface of the mold. When the grease has been removed shake out the loose chalk dust and with a brush wash the mold with warm alum solution (one half once of alum to one cup of warm water). Be sure to remove all of this washing solution. After the surface is dry, the mold is ready for the next step.

As a second precaution against the heat of setting plaster, grease the inner surface of the mold with a ***thin*** coating of stearine solution. See Figure 18. The film thus formed melts only at a temperature which is greater than that generated by the setting plaster. Now assemble all the parts except the bottom, and bind securely. See Figure 19. Everything is now ready to make the cast.

In the container for the mixing of plaster, place the amount of water needed to fill the cast. Then sift the plaster through your fingers into the water (refer to earlier article), until an island appears above the surface. Let soak for a few minutes, then stir gently. When the plaster composition assumes the consistency of very thick cream you may start pouring. First pour a generous amount into the mold. Then pour it back again into the container, turning the mold gently as you do so, being sure the plaster reaches all parts of the mold. This is continued until the plaster becomes thick. Then quickly fill the mold and set aside to harden.

When the bottom of the cast becomes quite warm to the touch, remove the shells and carefully lift away half of the mold. Place the molds into their respective shells at once. See Figure 20. Next scrape off the fine lines where the mold went together and set aside the finished statue to dry.

Before casting with the mold again, clean all pieces of plaster away and brush the mold again with the stearine solution and proceed as before.

For various finishing methods to be applied to the new statue, please refer to previous articles.

A TRIBUTE TO THE LATE GEORGE M. BRACE*

HOMER J. SMITH**

At risk of seeming false or unacquainted with propriety, I choose to intrude a note of sadness on this happy occasion. I know that all of you, including Mrs. Brace, will pardon brief reference to Mr. Brace and his connection with this club. There is a certain continuing loneliness and sense of loss in all our minds, and this is as it should be.

Mr. Brace bore a specific and unique relationship to this group. It was more than association or comradeship or brotherhood. It was a relationship quite akin to that of a father to a son.

He conceived this club, if my memory serves me well. He nursed it in its infancy and gloried in its growth. He supported it, counseled with it, and watched over it. He never lost interest in it. He continually referred to it in casual conversation. He spent time and money and special effort upon it. He

*Given at the Thirtieth Anniversary of the St. Paul Manual Arts Club, Feb. 3, 1942.

**Professor of Industrial Education, University of Minnesota, Minneapolis, Minn.

(Turn to Tribute to Geo. M. Brace on page 18A)

FIG. 18

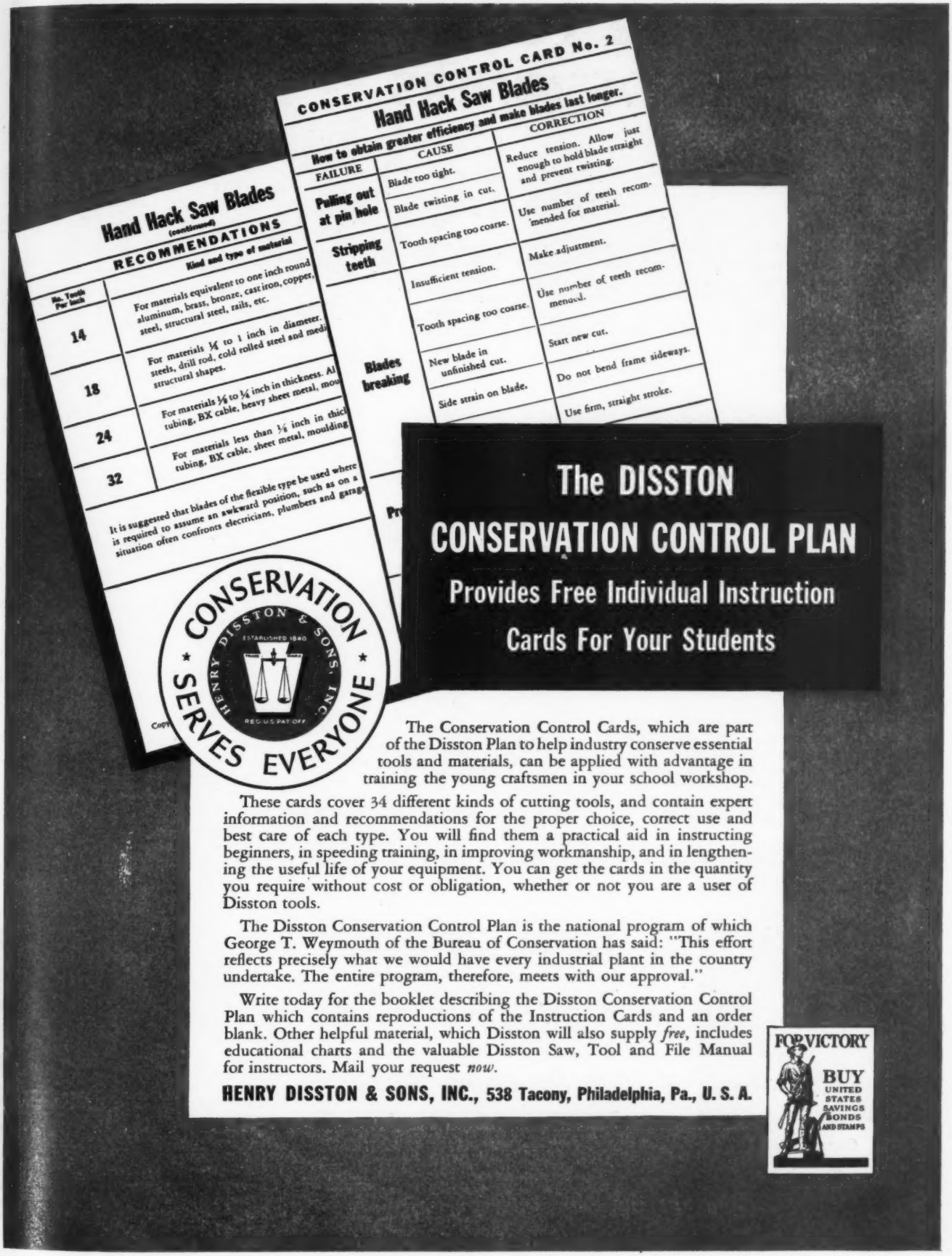
Grease each half of the mold

FIG. 19

Reassemble for cast

FIG. 20

Completed reproduction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Blade too tight.
Reduce tension. Allow just enough to hold blade straight and prevent twisting.
Blade twisting in cut.
Stripping teeth
Tooth spacing too coarse.
Use number of teeth recommended for material.
Insufficient tension.
Make adjustment.
Blades breaking
Tooth spacing too coarse.
Use number of teeth recommended.
New blade in unfinished cut.
Start new cut.
Side strain on blade.
Do not bend frame sideways.
Use firm, straight stroke.
Hand Hack Saw Blades
(continued)
RECOMMENDATIONS
No. Teeth Per Inch
Kind and type of material
14
For materials equivalent to one inch round aluminum, brass, bronze, cast iron, copper, steel, structural steel, rails, etc.
18
For materials ¼ to 1 inch in diameter. steels, drill rod, cold rolled steel and medi structural shapes.
24
For materials ⅛ to ¼ inch in thickness. Al tubing, BX cable, heavy sheet metal, mou
32
For materials less than ⅛ inch in thick tubing, BX cable, sheet metal, moulding
It is suggested that blades of the flexible type be used where is required to assume an awkward position, such as on a situation often confronts electricians, plumbers and garag
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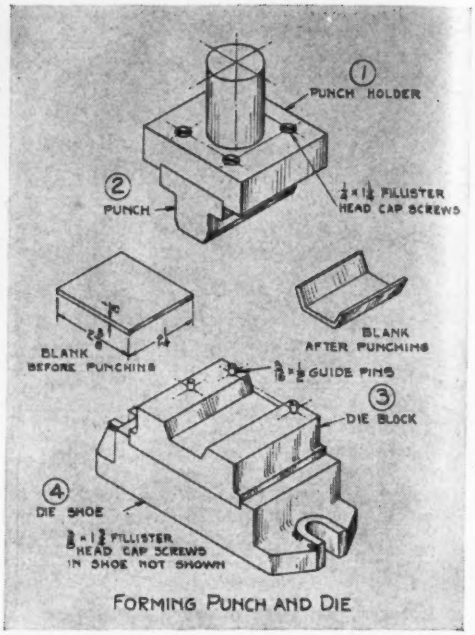

(*A free blueprint of the correct orthographic views of the Forming Punch and Die will be sent without charge if you will write to the address below *within 39 days*, asking for Blueprint No. 128-J5.)

Last Month

and the month previous, the two earlier project drawings appeared in this magazine.

SCHOOL BUREAU, JOSEPH DIXON CRUCIBLE CO., JERSEY CITY, N. J.

TRIBUTE TO GEO. M. BRACE

(Continued from page 228)

believed in it. He knew that it helped him to achieve some of his professional purposes.

He built and enjoyed friendships through this club, as was his nature, but his chief aim in fostering it was to do good through it — good to each of us and good to our work in this city and beyond. We may be certain that he wished the group Godspeed after his passing and he, thereby, placed a clear obligation upon us. This challenge by him seems not to have been ignored, for we are a large and interested gathering here this evening on this anniversary.

George M. Brace

Clubs such as this are a boon to any movement and to any collection of workers. This club has been of a type to hold men together and to hold them closer to their daily jobs. Membership here has been inspiring and it has led to individual, group, and city progress.

We need such ties as this to bring us more often together, especially in days and years like these. This is no time for bickering and strained relations. This is no time for petty politics and silly selfishness. This is a time, rather, for better work through more cooperative endeavor. It is a time for liking each other and helping each other, so that weeks may be more pleasant and good results of our efforts more certain.

I like to think, and I know you think, that the Saint Paul Manual Arts Club has been and is worth while. George M. Brace did not, in this instance, "build better than he knew." He understood what this club could be and what it could come to mean. That is why he took it unto his heart as a major project. Therefore, we do honor to his memory here tonight in marking this milestone and in looking forward to the meetings and the years that are to come.

Personal News

CARL A. BELL DIES

Carl A. Bell, director of vocational education for the state of Illinois, passed away in Lincoln, Ill., on Thursday, February 12. His untimely death was brought about by an automobile accident on February 5. Mr. Bell was a native of Illinois and he was 36 years old. He was a graduate of the University of Illinois where he received his master's degree in vocational agriculture. He was a teacher of vocational agriculture at Carey, Ohio, and at Fischer and at Pontiac, Ill. He was appointed to the Illinois board for vocational education in 1935 as supervisor of vocational education, and was made director of vocational education in 1937.

Carl A. Bell

At the time of his death he was president of the national association of state directors of vocational education.

Mr. Bell is survived by a wife and two children.

♦ RAYMOND OLIVER enlisted in the United States Air Service last May and was stationed at Kelley Field, Tex. He received a commission as First Lieutenant in the Air Corps, and had been selected to serve as a flight instructor.

(Continued on page 20A)

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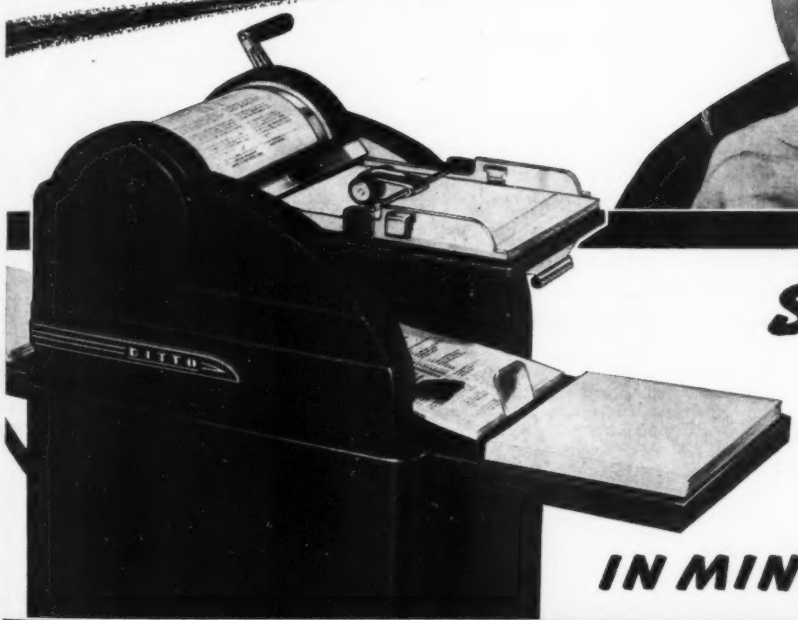

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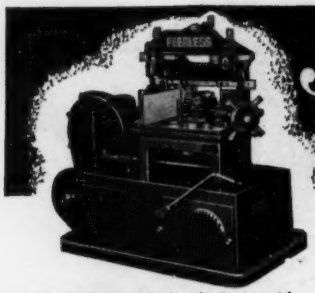

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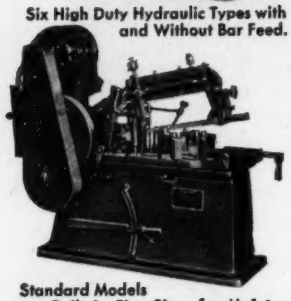

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There are four bulletins covering the broad Peerless Line — Bulletin 50-A on High Duty Hydraulic types . . . Bulletin 53 on Heavy Duty Hydraulic Saws for die-block work . . . Bulletin 51-A for Universal types with mechanical control . . . and Bulletin 52 covers Standard Models for general utility cutting.

All bulletins sent free on request to Dept. J.

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Cap. @ 45° Angle	4" x 6"	6" x 10"		6" x 10"	9" x 13"	4" x 6"	5¾"	10"	
Speeds (3) Strokes Per Min.	60-100 140	50-85 125	50-85 125	50-85 125	50-85 125	50-85 125	50-85 125	50-85 125	75-100
Floor Space	30" x 54"	36" x 57"	24" x 43"	30" x 68"	38" x 75"	21" x 54"	26" x 86"	28" x 102"	16" x 30"
Shipping Weight with Motor	2170 lb.	2930 lb.	1000 lb.	2175 lb.	3200 lb.	1125 lb.	1460 lb.	2110 lb.	250 lb.

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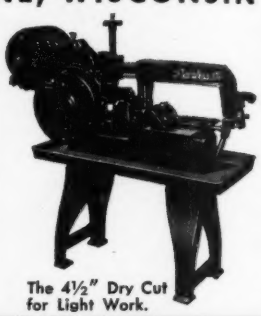


The 4½" Dry Cut for Light Work.

(Continued from page 18A)

In the middle of December his plane crashed during night maneuvers, and he was killed. He was granted a master's degree in industrial-arts education by Ohio University at Athens, and he had taught in the Athens High School for several years. He had also served as assistant in the department of industrial arts at Ohio University. His home was at Byesville, Ohio.

♦ WILLIAM M. FEIST, of the Tappan Intermediate School faculty, Detroit, Mich., died December 23, 1941. He was born in St. Paul, Minn., in 1894. He graduated from Stout Institute and taught in Janesville, Minn., and in the Detroit schools.

He served overseas in World War I. In Detroit he taught in the Robert Burns School and at the Tappan Intermediate. He was an active member of the Mu Sigma Pi fraternity and gave freely of his time whenever he could be of service. He was a member of the University Post of the American Legion. Feist received his bachelor's degree from Wayne University and his master's from the University of Detroit. About forty members of the fraternity attended the funeral. He is survived by his widow, Mrs. Elizabeth Feist.

♦ Dr. S. L. Coover and Mr. A. T. Stavaski were formally initiated into Epsilon Pi Tau, at Ohio State University, Columbus, Ohio, on February 6.

The initiation was held in the afternoon at the university, at which time 12 candidates were admitted into the fraternity. In the evening there was a dinner at the Maramour. Dr. Robert S. Gilchrist, director of the University School at the Ohio State University, was the principal speaker of the evening. He stressed the important part industrial arts is playing in the present war, and he also said that the American public was not yet aware of the seriousness of the conflict.

Among the guests at the meeting were Kenneth C. Ray, state director of education for Ohio; O. E. Hill, assistant director of education for Ohio; Hobart L. Bell, assistant secretary and editor, Ohio Education Association; L. K. Replogle, assistant superintendent of schools, Columbus, Ohio; Mr. A. T. Stavaski, professor of industrial arts, State Teachers College, California, Pa.; and Charles B. Mendenhall, assistant professor of education, Ohio State University. The guests were introduced by Richard R. Crow, a former California State Teachers College instructor who is at present an employee at the Curtiss-Wright Corp., Columbus, Ohio. The toastmaster was Elmer J. Zabor.

♦ SUPT. E. A. T. HAPGOOD, Mount Morris, N. Y., for many years an assistant superintendent of schools at Albany, N. Y., has been re-elected unanimously for an eighth year.

During Superintendent Hapgood's administration in Mount Morris many constructive and progressive features have been introduced in the local program, including an enriched program from the kindergarten through senior high school, with industrial arts for both boys and girls, club and student activity periods daily as part of the regular program, an improved program for custodial care and maintenance of school property, etc.

♦ HUGH P. HARSHBARGER, of Maine Township High School and Junior College, Des Plaines, Ill., has been appointed co-ordinator of all branches of civilian defense workers in District 10, embracing all the communities from Edison Park up to Barrington, as well as Wheeling and Schiller Park, Ill.

Mr. Harshbarger's job will be to supervise the entire training program of this wide area, which will include such groups as auxiliary police, first aid, fire wardens, air-raid wardens, bomb squads, etc.

This area includes over 100,000 people.

♦ ALBERT THOMPSON has been appointed to teach B- and C-class English this semester at the Henry Ford Trade School, Dearborn, Mich. He received his bachelor of arts degree from Detroit Institute of Technology in 1941. Mr. Thompson is taking the place of R. G. WILLIAMS, who is now teaching mathematics.

Replacing BUTLER BREWEN, who is now teaching mathematics at Willow Run Bomber Plant School, JOHN DOBREI will take care of the class records in addition to teaching three English classes.

♦ CLIFFORD C. CARLSON, assistant to Mr. H. B. Nash, superintendent of schools, West Allis, Wis., has been temporarily filling the vacancy left by Mr. R. R. Van Duzee, who was appointed director of the West Allis School of Vocational and Adult Education.

Mr. Carlson received his bachelor's degree from the Stout Institute in August, 1930. Since that time he has taken work from the University of Wisconsin, the River Falls State Teachers College, Northwestern University, and Marquette University. He received his bachelor's degree with a major in mathematics from the River Falls State Teachers College, River Falls, Wis., in 1938. At present he is doing graduate work at Marquette University, Milwaukee.

He taught at Clear Lake, Wis., from 1928-32. Since that time he has been connected with the West Allis public schools.

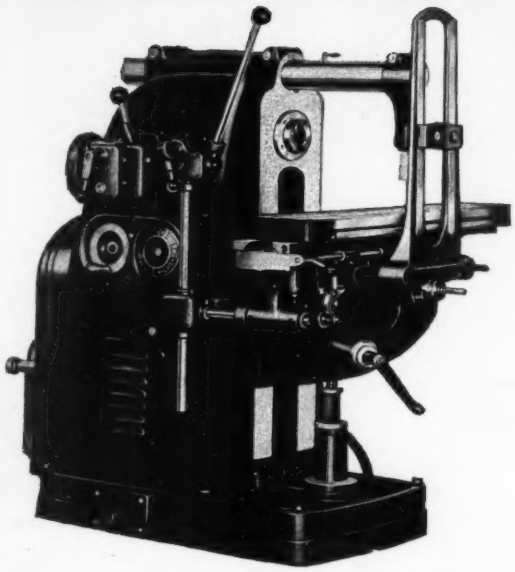
♦ The following, all former students and graduates of the Civilian Pilot-Training Program carried on at the Bradley Polytechnic Institute, Peoria, Ill., are now engaged in some phase of air service:

Ensign, Navy Aviation: Kenneth Hippe, Grant B. Nelson, Herbert Young, John Gates, James L. Montgomery, Arthur F. Minier, and Clarke Chamberlain.

Flight Instructors, Army: John R. Holmes, Arlyn Read, Millard Sommer, Robert W. Stuffings, and Clarence Lunde.

(Continued on page 22A)

DELIVERY NEXT MONTH!



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Today's intricate weapons of war call for small precision parts in tremendous quantities. Simmons No. 1A Milling Machine is ideal for that type of production, and because it is simple to operate, efficient, economical, it is ideal for training purposes.

The Simmons Micro-Miller, equipped with our own variable speed drive and spindle brake, offers a wide range of speeds (56 to 630 RPM) any of which may be instantly obtained by a turn of the hand-wheel adjacent to the Selector Dial on the column. Result? The Right Speed For The Job. And that means higher precision . . . faster, more economical production!

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Feeds: Longitudinal, 34"; Cross, 8"; Vertical, 18½"

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Equipped with Micro-Speed Drive (our own variable speed transmission) and Selector Dial Control by which speed changes are made instantly, this machine is excellent for student training. Simmons No. 2 Turret Lathe is being used in major war production plants all over the country.*

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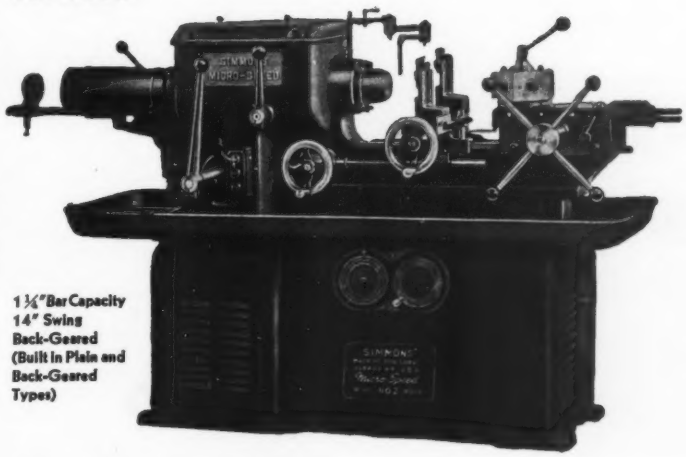

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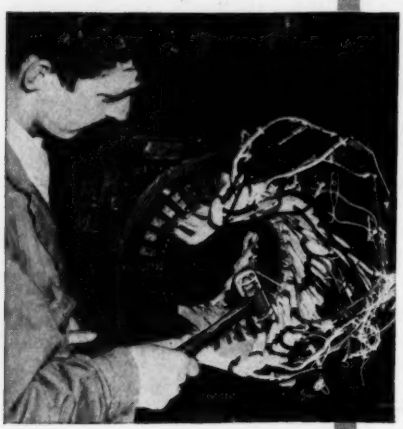

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DIVISION OF THE STANLEY WORKS

EDUCATIONAL DEPT.

NEW BRITAIN, CONN.

(Continued from page 20A)

Naval Flight Training: Roy F. Johnson, Larry J. Sovanski, William G. Kakara, Jack C. Stever, and Dean Arnholt.

Instructor, Navy Air Corps: Arthur G. Erickson.

Flight Instructors (Civilian): Robert Johnson, James Baird, Roger Sutton (United Air Lines), John Moran (Pan-American Airlines), and Cecil Walker (Air Traffic Control).

Ensign, Navy: John R. Curl, Albert Pfanschmidt, and Ralph White.

Lt., Army Air Corps: Bernard R. Muldoon, Thomas D. O'Brien, John L. Moutier, William Weldon, Alvin Strunk, and Randall Holzapple.

Army Air Corps: Byron Kluesing, Robert Strawn, Philip Farmer, Arthur Szold, Murray D. Bost, Jack Timken, and William Whiteside.

Instructors, Army Air Corps: Joseph M. Robinson, Blair Robertson, Franklin Harris, and Herbert Scott.

♦ HAROLD E. SANGER of the Chicago School of Printing and Lithography spoke before the North Side Printers Guild of Chicago at their November meeting, on the importance and need for training young men for the printing trade.

Many members of the National Association for Printing Education are serving this month as state chairmen of Printing Education Week which is sponsored by the N.G.A.E.A.

♦ FRANK DI GIACOMO, formerly teaching at the New York School of Printing, has been called to duty as first lieutenant in the United States Army. At present he is assistant to the personnel adjutant at Fort Jay, and is athletic and recreation officer for the post.

♦ CHARLES F. ZINN has been appointed adviser, division of industrial education, Department of Public Instruction, Harrisburg, Pa. His duties will embrace counseling with school districts and school offices with respect to retraining all day vocational schools, trade extension education and industrial-arts education.

♦ John Senser has been appointed to the position of supervisor and director of industrial education in the public schools of Clovis, N. Mex.

♦ MAX GOLDMAN and MELVIN DAVIES, who completed the four-year industrial-arts course at Indiana State, at the close of the winter term, have accepted positions as teachers in the National Defense Training Program at Harrisburg, Ill. They began their work March 16.

♦ F. N. NEWTON, JR., formerly connected with the Sharpsville School system, is now supervisor of mechanical drawing in the Sharon public schools, Sharon, Pa.

♦ HARRY P. BUBOLTZ, the head of journalism and printing education at the Ottawa Hills High School of Grand Rapids, Mich., edits the monthly "News Review" of the Michigan Industrial Education Society. He also is taking graduate work at the Stout Institute.

♦ M. R. KLEIN, formerly instructor of mechanical drawing at the Nathan Hale Junior High School, Cleveland, Ohio, has been appointed director of the Educational Museum with its visual aids for the schools of Cleveland.

♦ DR. R. H. SNITZ, professor of industrial arts at Indiana State has been ill for several weeks during the winter. He was in the hospital for three weeks, but resumed his teaching at the beginning of the spring term.

♦ RALPH C. WENRICH, formerly adviser, division of industrial education, department of Public Instruction, Harrisburg, Pa., has been commissioned lieutenant with the U. S. army, Camp Pendelton, Va.

♦ JOHN CONAWAY, who has taught industrial arts for the past five and one-half years in the Kokomo schools, resigned recently to accept a position with the United States Navy as instructor.

♦ There are five Stout graduates teaching in the aviation machinist mates school at Jacksonville, Fla. They are ROLLIN NORRIS, GEORGE ALT, FRED STRACK, CARL STUCKEY, and HENRY HARTMAN.

♦ ERVIN WOLF, senior at the Stout Institute, is substituting for two weeks at Wisconsin Rapids. LAWRENCE WOLSKI, former teacher, has resigned recently to accept a position in the Chicago vocational school.

♦ JACK HESSELMAN, JOHN RICHTER, HENRY PETRYK, and ARNIE LIEN have been appointed to the faculty of the Chicago Vocational school, Chicago, Ill.

♦ ENSIGN RAY CHRISTMAN is in Raleigh, N. C., taking a course in diesel engineering. He was formerly stationed at U.S.S. Prairie State, New York City.

♦ J. W. COUCH, formerly a vocational teacher in the Kokomo City Schools, was elected to fill the vacancy created by the resignation of John Conaway.

♦ STANLEY PERRY and J. F. EDLIN have been appointed instructors of metalwork and machinery repair, and ED BURD instructor of truck repair at Hodgenville, Ky.

♦ JIM SCHWARTS, a junior from The Stout Institute, Menomonie, Wis., has taken the position at Black River Falls, Wis., vacated by Pat Murphy.

♦ LEO SAMDAHL has finished the Officers Training Corps at Fort Benning, Ga., and has attained the rank of second lieutenant.

♦ EINAR SIRO has been appointed to the teacher-training staff at the Armored Force School, Fort Knox, Ky.

♦ LEONARD STOLFO is teaching printing in the Fordson High School, Dearborn, Mich. Mr. Stolfo taught in Hamtramck until recently.

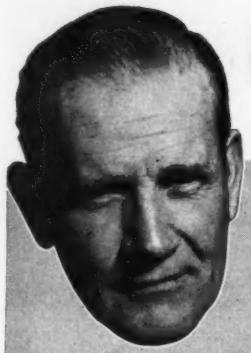
♦ PAT MURPHY, formerly teaching at Black River Falls, Wis., is now teaching at the Chicago Vocational School, Chicago, Ill.

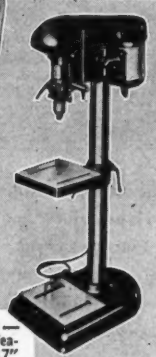
♦ B. K. BEAUCHAMP is teaching machine shop in the Taylor School at Davenport, Iowa.

♦ WALTER BILLIET and EVERETT HASSE are both teaching in the Fordson High School in Dearborn, Mich.

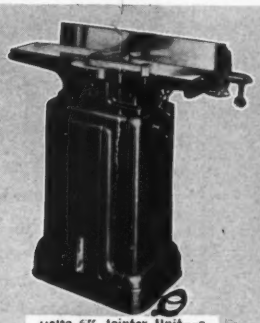
(Continued on page 25A)

"These Low-Cost Machines help my training program"...





Delta 14" Drill Press — has numerous special features. A full line of 17" models also available

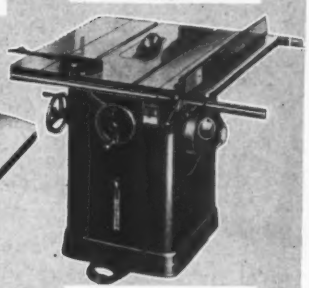


Delta 6" Jointer Unit—a compact, well guarded unit with dual-control handle, patented fence and other special features

Delta 14" Band Saw — sealed-for-life ball bearings, tilting table. In both wood and metal-cutting models

Delta 12" Lathe, equipped with sealed-for-life bearings, self-indexing headstock—ideal for school shops

Delta 24" Scroll Saw — Revolutionized modern scroll saw design. Offers minimum vibration and blade breakage



Delta 10" Tilting Arbor Circular Saw — has many exclusive features

An industrial training executive said recently: "I have found that Delta low-cost high-quality machine tools have definitely helped solve some of our problems in vocational training. We have found that Delta machines have been widely adopted by industry on an astonishing scale — so that by using Delta machines in our school, we can now train students on the same machines they will use in industry. And — on a price basis — we can equip one of our shops for almost 70% less money by using Delta machines instead of heavy mill-type machinery — or to put it another way, we can purchase equipment to train nearly three times as many students for the same investment.

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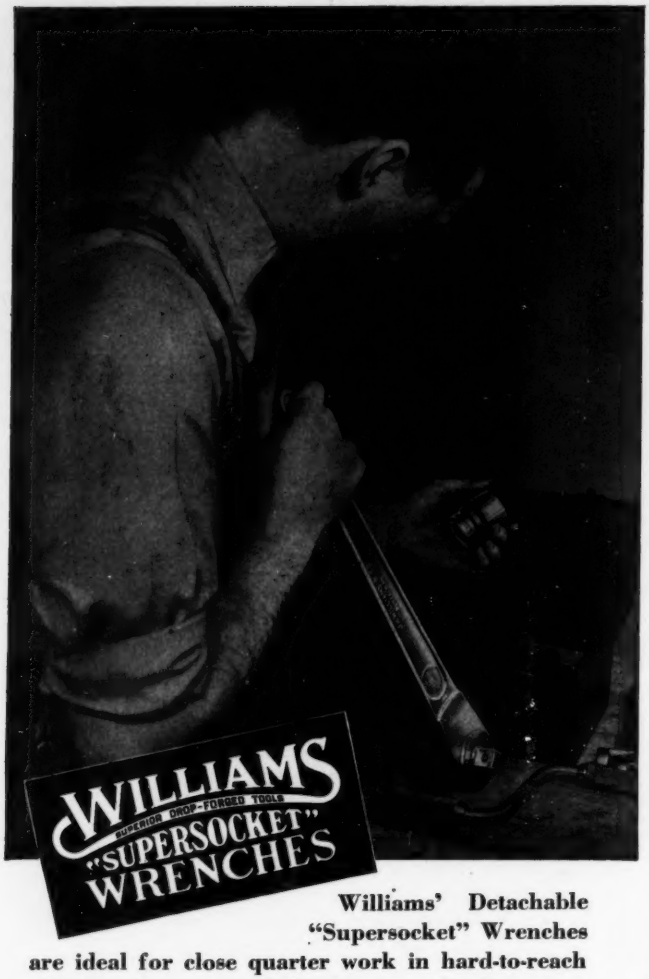

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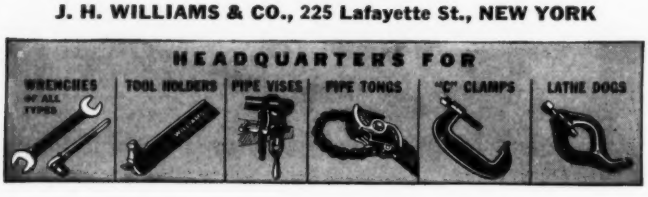
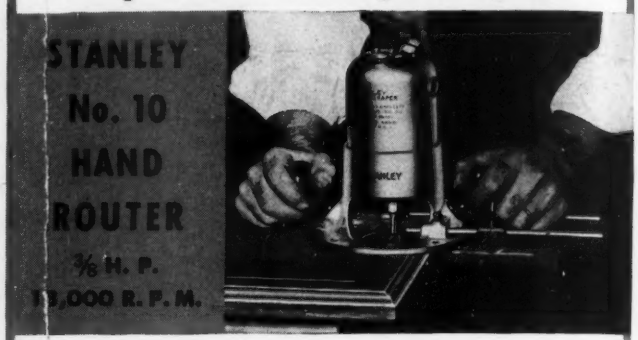


Make "FANCY" Finish a part of Every Project



Let your boys put a professional finish on their work with a Stanley No. 10 Hand Router and you'll see a 100% response in added interest. Plenty of variety . . . use it for inlaying, veining, carving, dovetailing, rabbetting, and many shaping cuts. Its high speed motor, 18,000 R.P.M., permits smooth, clean cutting, both with and against the grain.

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THE LINCOLN ELECTRIC CO.
Educational Dept. Cleveland, Ohio

(Continued from page 22A)

♦ GEORGE DANFIELD will teach general shop at Princeton, Minn., for the balance of the year.

Association News

THE ILLINOIS VOCATIONAL ASSOCIATION

The annual convention of the Illinois Vocational Association, held at the Morrison Hotel, Chicago, Ill., March 26, 27, and 28, was a real success in every way. In the association are combined the Illinois Association of Vocational Agriculture Teachers, the Illinois Art Teachers Association, the Illinois Business Education Association, the Illinois Vocational Home Making Teachers Association, and the Illinois Industrial Education Association.

There were many tours to schools, places of business, and museums, scheduled for Thursday afternoon, and the Trade and Industrial dinner was held on Thursday evening. The chairman at this dinner was J. W. Thompson, supervisor of trade and industrial education, Springfield, Ill.; and Allen R. Edwards, principal, Township High School, Marion, Ill., was the toastmaster. Representatives of the school, employers, labor, and state and federal offices of education, discussed trade and industrial education.

The Conference of Local Supervisors of Trade and Industrial Education, Teacher-Trainers, and School Administrators, and the Preparatory Vocational Education Section also held their meetings on Thursday.

At the industrial round-table luncheon Friday noon, under the chairmanship of F. T. Curl, Argo Community High School, Argo, Ill., Dr. William T. Bawden, Pittsburg State Teachers College, Pittsburg, Kans., spoke on the subject of "Industrial Arts in the War Program." He emphasized the advantages of such projects as the navy's airplane models, work for the Red Cross, games for the USO, and the like.

Because of illness Dean Clyde A. Bowman, Stout Institute, Menomonie, Wis., was unable to be present, but Arthur G. Brown, head, department of education, Stout Institute, read his paper. In it was pointed out that every high school student could profit by a broad industrial-arts course because by it the student could reach economic competency in the shortest possible time. This factor is especially true at this time. Industrial-arts courses also raised the students' consumer intelligence, a matter of importance in these days when priorities affect so many materials which enter into so many products of human consumption.

At the industrial education meeting held Friday afternoon, Seymour E. B. Holmen, director, Washburne Evening Trade School, Chicago, Ill., was chairman. At this meeting V. J. Swanson, director of training, International Harvester Co., Chicago, Ill., spoke on "The Value of Long Time Apprentice Training in Our National Crisis —From Industries Point of View."

He predicted that this war would be over in four years unless Hitler and the Japanese succeeded in making contact, in which case it might even last 20 years.

He also stated that industry is aware of its needs and is looking upon apprenticeship as a pool from which to obtain its skilled resources for the postwar period.

Dr. William F. Rasche, director, Milwaukee Vocational School, Milwaukee, Wis., explained "The Value of Long Time Apprentice Training in Our National Crisis — From the Schools Point of View." Dr. Rasche emphasized that social science must be the basis of our considerations of this question of preparing our future skilled workers, and employers and labor must treat the question fairly.

The number of apprentices in every city and in every industry is but an infinitesimal part of the total number of workingmen.

(Continued on next page)

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THE TRAINED DIESEL MAN
ALWAYS IS IN DEMAND

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New ships by the hundreds use the Diesel for their power requirements, while existing boats are being converted from steam to Diesel. In the last year 76% of all locomotives ordered were Diesel powered.

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An easy-to-understand course in the operation and maintenance of all kinds of marine, stationary, and mobile Diesel engines. 45 lessons with 20 questions and answers at the end of each lesson. Written particularly for students who have not had advanced technical training. Green cloth-binding, 824 pages.

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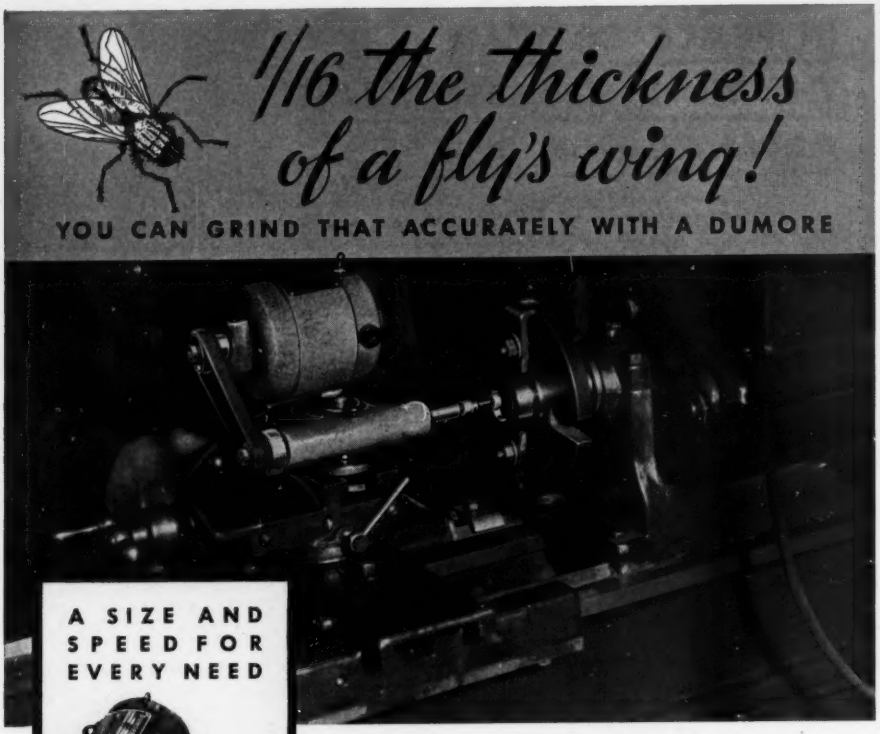
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Dumore PRECISION Grinders

(Continued from previous page)

Germany gave boys industrial training whether work was available or not. England felt that it could not afford to train its youth in this way. When Hitler went to war he had thousands of apprentices where our country had but hundreds.

Our schools should train apprentices but they should give them something on economics and the social sciences, besides skills.

J. A. Brandt, teacher of metalwork, High School, Mooseheart, Ill., was elected chairman for the Part-Time and Full-Time Industrial Education Section for the coming year.

The Illinois Vocational Association Banquet was held on Friday, March 27, at the Casino, Morrison Hotel. Dr. William H. Johnson, president, Illinois Vocational Association, was the toastmaster on this occasion. The attendance was very large.

Dr. L. H. Dennis, executive secretary, American Vocational Association, Washington, D. C., was the main speaker and his subject was "National Trends in Vocational and Practical Arts Education."

He stated that vocational education was on the crest of popularity now and that there is an immense challenge to every teacher engaged in this type of work.

He stated that a federal plan will be worked out to unify vocational education over the United States. He also expressed the conviction that after this war is over there will be a new and more cordial relation between the teachers of industrial arts and vocational education.

The Ship Program was put on directly after Dr. Dennis' address.

At the industrial-arts meeting Saturday morning, Robert English, assistant professor of industrial education, Southern Illinois State Normal University, Carbondale, Ill., acted as chairman and Arthur B. Mays, University of Illinois, was the discussion leader. Other members of the panel were Dr. Verne C. Fryklund, University of Minnesota, Minneapolis, Minn.; Dr. William T. Bawden, Kansas State Teachers College, Pittsburg, Kans.; John J. Metz, editor, INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, Milwaukee, Wis.; E. J. Simon, Urbana, Ill.; H. C. Nelson, Monmouth, Ill.; Elmer Christy, Cincinnati, Ohio; and George F. Henry, Fort Collins, Colo.

The discussion centered about "Pertinent Problems Confronting Industrial Arts in These Times of War Emergency."

At the end of the meeting Paul Roise, supervisor of industrial education, Cicero, Ill., was elected president of the Industrial-Arts Section for next year. This also makes him vice-president of the Illinois Vocational Association.

The Illinois Vocational Association luncheon, sponsored by Epsilon Pi Tau, was held Saturday at 12:30 noon.

Paul H. Harrison, Northern Illinois State Teachers College, De Kalb, Ill., was chairman At this luncheon Elmer W. Christy, director, industrial arts, Cincinnati, Ohio, was the main speaker. His subject was "Evaluating the Program of Industrial Arts and Vocational Education in the Light of Present and Future Needs."

Mr. Christy cautioned that in these strenuous times we must avoid hysteria and not yield to the impulse of the spectacular, but rather hold to the objectives of industrial-arts work. He recalled the history of industrial arts from the early manual-training days and called attention to the work of such men as Dr. Richards, Dr. Bonser, and others. He showed also how both industrial arts and vocational education have expanded in the course of years, and emphasized that there were four times more industrial-arts teachers than teachers of vocational education in the United States in 1940.

Classing as skilled workers those who required six months or more of training to qualify themselves for an occupation, he pointed out that according to studies made in 1930, the skilled workers were but 6.3 per cent of the gainfully employed between the ages of 16 and 29. Because the training given now is an emergency proposition which emphasizes immediate competency, he cautioned that secondary education should be planned for what is needed now, not for the after-war period. He said there is great need to provide worth-while work experiences which, under present living conditions, have practically faded out of existence for children in urban sections. He said that the disciplinary values of industrial-arts work experiences are valuable for the large percentage not included in the 6 per cent of skilled workers already referred to, and that for most of our youth diverse work experiences will be the best preparation for entrance into life jobs.

The officers elected for the coming year for the Illinois Industrial Education Association are: president — Kenyon S. Fletcher, Illinois State Normal University, Normal, Ill.; secretary — Louis V. Newkirk, director of industrial arts, Chicago, Ill.; treasurer — Paul H. Harrison, Northern Illinois State Teachers College, De Kalb, Ill.

The location chosen for the next convention is Peoria, Ill. The dates of the convention will be given at a later date.

♦ On Tuesday, February 3, 1942, the St. Paul Manual Arts Club held a joint meeting with the Ladies' Auxiliary, to celebrate the club's thirtieth anniversary. The charter members present occupied seats of honor at the dinner. Also included with the honored guests was the Acting State Director of Vocational Education for Minnesota, Mr. Harry C. Schmid, and Mrs. Schmid; the head of the trade and industrial education department at the University of Minnesota, Dr. Homer J. Smith, and Mrs. Smith.

President W. Burwell, after his opening remarks, turned the meeting over to Mr. B. H. Brynildsen, director of vocational education in St. Paul, who acted as master of ceremonies.

The charter members present were introduced and they told a little about the club. Mr. Sitzer

(Continued on page 28A)

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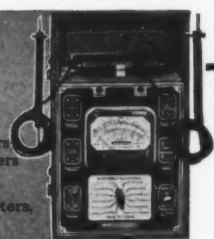

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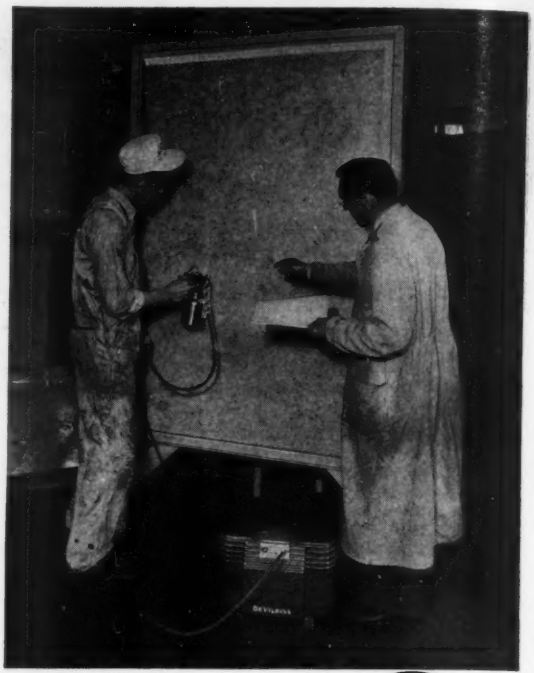

Photo courtesy of William Hood Dunwoody Industrial Institute Minneapolis, Minnesota

DEVILBISS SPRAY SYSTEMS

(Continued from page 26A)

spoke on the Organization and Development of the St. Paul Manual Arts Club. The following men are still on the job in St. Paul: C. O'Connell, Ed. Pfeiffer, C. E. Sanders, H. Sitzer; retired, but in the city are: L. H. Harnsberger and J. W. Powles. Mr. Hans W. Schmidt is with the Wisconsin Department of Public Instruction, Madison, Wis., and J. I. Sowers is supervisor of manual arts at Miami, Fla. No one knows just where L. M. Robbins and W. G. Keckler have gone.

Mr. Schmid gave a short informal talk, and there were piano numbers by Miss Munch, and vocal numbers by two members of the club — Messrs. Heuer and Aga. Dr. Homer J. Smith paid tribute to Mr. George Brace, former director of vocational education in St. Paul. (The tribute appears elsewhere in this issue.)

Letters from absentee charter members J. I. Sowers and Hans W. Schmidt were also read. P. S. Amidon, superintendent of schools, sent a letter of congratulations on the long and active service of the club, which also was read.

♦ The department of industrial and vocational education, of Kansas State Teachers College, Pittsburg, Kans., held its seventh annual dinner at the college cafeteria on Saturday evening, March 7, at 6 o'clock. The dinner is held each year to provide opportunity to hear reports from members of the faculty who attend the two important industrial education conventions of the year.

Two members of the department staff attended the 32nd annual meeting of the Manual Arts Conference of the Mississippi Valley at the University of Minnesota, Minneapolis, October 23 to 25. One member represented the college at the 35th annual convention of the American Vocational Association, Boston, Mass., December 10 to 13.

Besides members of the department faculty and their wives, and members of the senior class, other guests at the dinner were President and Mrs. Rees H. Hughes, Dean and Mrs. O. P. Dellinger, Dean Jennie C. Walker, and Miss Gladys E. Walker, all of the college faculty.

Prof. Walter L. Friley reported on the meeting of the Manual Arts Conference. Dr. William T. Bawden, head of the department, served as toastmaster and reported on the Boston meeting of the American Vocational Association.

Prof. Earnest W. Baxter reported on a visit made in December to Springfield, Mo., for the purpose of inspecting the exhibits set up in the special train of the U. S. Office of Production Management. Connections were made through which it is hoped that some construction work may be allocated for the college shops when the OPM has perfected a plan for distributing defense contracts among small manufacturers.

♦ Résumé of an address given by Dr. Benjamin E. Mallary, Professor of Education, University of California, before the Fellowship Banquet, Epsilon Pi Tau, held at the St. Francis Hotel, San Francisco, Calif., February 21, 1942.

Subject: Guidance Values of the Industrial Arts Program.

Dr. Mallary prefaced his remarks with the emphatic assertion that the industrial-arts teacher had an opportunity to accomplish an objective which all education held to be desirable, but which heretofore had been difficult of achievement in academic programs.

This is the opportunity to teach individuals to work together. Dr. Mallary declared that more than 80 per cent of the cases brought before the California State Personnel Board, of which he is a member, had their inception in the failure of individuals to get along with other individuals rather than upon inability to perform specific duties.

The speaker made a strong plea for group projects. He pointed out that for students to cooperate with one another in an academic subject, such as geometry, might lead to emphatic discipline. In industrial-arts work, wherever two students work on a single project, there is the essence of an industrial organization.

Recalling his activity in Washington as a lieutenant, Rex Tugwell, the speaker, declared that in the cases of men who were being considered for executive work under the national government, three questions were always asked: "Does he know the score?" "Does he know his way around?" "Is he a good fellow?"

"I know this sounds cynical," Dr. Mallary said, "but it is not." "Does he know the score?" may be interpreted "Does he know the policies and the objectives of the firm or agency for which he will work?" "Does he know his way around?" means "Does he know how to get things done within the corporation, governmental agency, or other organization where he will be working?" "Is he a good fellow?" simply means "Can he work smoothly with others?"

In discussing guidance, Dr. Mallary expressed the opinion that broad objectives should be preferred to narrow job procedures. "Catch yourself a job" is his advice to those who seek his counsel. "Any kind of a job! After you have had this for a while, there will be time to talk about vocational guidance. I tell them the facts of industrial and business and political life. I pull no punches. They have to learn to get along with bosses of the most undesirable types, and to learn to work in unpleasant circumstances. They might as well know these things now."

In closing, Dr. Mallary paid tribute again to industrial arts as the ideal educational agency for teaching individuals, working together on group projects, the methods and mechanisms of industrial living as well as the objective of the modern world.

(Continued on page 30A)

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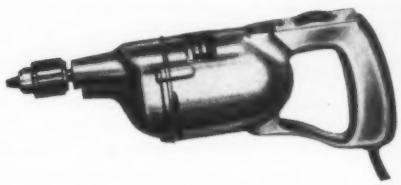

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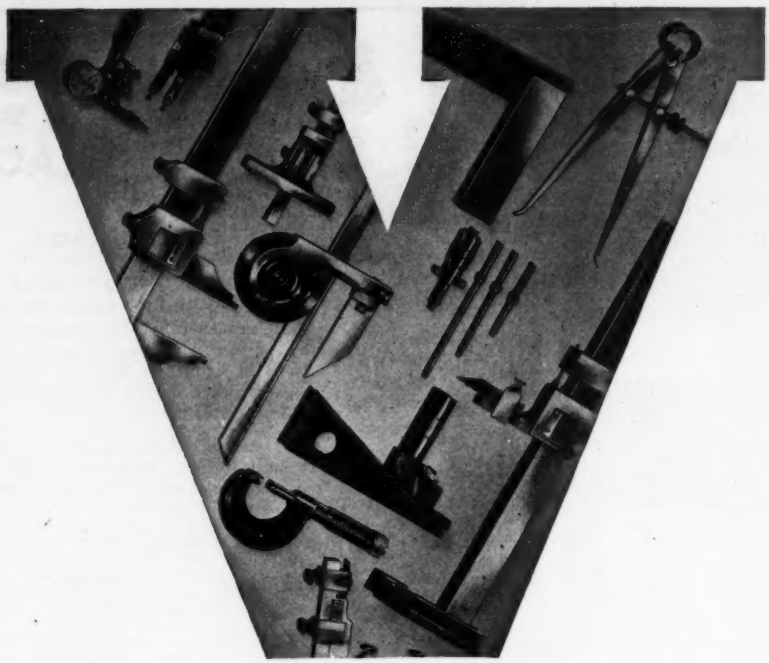

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STARRETT TOOLS

(Continued from page 28A)

♦ The soap carving contest sponsored by the school Crafts Club of New York City was a great success. Our sincere thanks go to Mr. John Hurley for his inspiring instruction, his array of prizes, and his selection of such expert and impartial judges. Thanks also are due to Lever Bros. for their generous contribution of soap and their highly instructive film on soap carving.

To many of the members, this was a new medium offering wonderful possibilities, and in short order, life began to emerge stately penguins, lordly eagles, dogs lacking nothing but the bark, and a multitude of other impressive carvings. Indeed, the judges' task of selecting 10 prize winners was not an envious one.

Each member felt that he was privileged to associate with such an enthusiastic and progressive group where one may find stimulation through the exchange of ideas as well as participate in exploring the limitless field of industrial arts.

The next meeting will be held on April 18, at the Imperial Hotel, New York City. Alan McGregor, program chairman, is making arrangements for another interesting meeting.

The 40th anniversary meeting will be held in the Gold Room of the Hotel Imperial, on May 16.

— John M. Matheson

♦ Plans are definitely under way for a wartime conference on Printing Education — the 21st Annual Conference sponsored by the National Graphic Arts Education Association — to be held in Pittsburgh, Pa., June 29 to July 1, 1942. Instead of the four-day conference, as originally contemplated, it has been decided to limit it to three days. The meetings will be held at the Carnegie Institute of Technology, with the possibility of holding one meeting at a prominent vocational school of the public school system or at the headquarters of the Pittsburgh Board of Education.

♦ The third annual Upper Michigan and Wisconsin Graphic Arts Education Conference will be held on Friday and Saturday, April 10 and 11, at Green Bay, Wis.

Erwin Heyman, Roy O. Larson, Leonard A. Petersen, and Victor Pintz, Green Bay printing instructors, are conference chairmen.

♦ The Tenth Annual Pennsylvania Industrial-Arts Conference is scheduled to be held at the State Teachers College, California, Pa., April 24 and 25, 1942. Dr. Francis B. Haas, state superintendent of public instruction, Harrisburg, Pa., and Dr. William E. Warner, professor of education at Ohio State University, Columbus, Ohio, will be among the speakers.

♦ The annual convention of the Iowa association of future farmers of America will be held at Iowa State College, Ames, Iowa, at the time of the Veisha program on April 30 and May 1.

♦ The Pennsylvania Vocational Association will hold its annual convention at Eagles Mere, Pa., on June 25, 26, and 27. The Forest Inn Hotel will be the headquarters.

F. Theodore Struck, State College, Pa., is the secretary.

New Publications

It's Fun to Build Modern Furniture

By Clifford K. Lush. Cloth, 111 pages, 6 by 9 in., illustrated. Price, $1.75. Published by The Bruce Publishing Co., Milwaukee, Wis.

This book presents working drawings of about 50 interesting pieces of modern furniture especially designed for elementary woodworking classes.

The content is so arranged that student and teacher have a wide range of choice as to projects, materials to be used, and finishes to be applied.

The projects are based on the experiences gained by the author in the classroom. The designs are good, and every one of them contains that which arouses boy interest.

Milling Machines, Shapers, and Planers

Prepared under direction of the Chief of the Air Corps. Paper, 192 pages, 5⅞ by 9 in., illustrated. Price, 25 cents. Published by the Superintendent of Documents, Washington, D. C.

This is a technical manual put out by the War Department under the direction of the Chief of the Air Corps.

It is divided into 8 chapters which give a description of the milling machine and directions for its maintenance; an understanding of the different types of machine cutters; the holding and indexing of work; various types of milling-machine operations; and gear calculations.

Shapers and planers are then described in the same manner as was used for the milling machine.

House Construction Details

By Nelson L. Burbank. Cloth, 331 pages, 8⅛ by 11¼ in., illustrated. Price, $3. Simmons-Boardman Publishing Co., New York, N. Y.

This second edition, with corrections, presents an excellent basic book for the teacher of carpentry. It is complete, concise, and profusely illustrated.

Practical Marine Diesel Engineering

By L. R. Ford. Cloth, 590 pages, 6½ by 9⅜ in., illustrated. Price, $5. Published by Simmons-Boardman Publishing Co., New York City.

This is the third edition of this book. Its author is well qualified by experience to write it, and he has covered the subject in most excellent style.

The developments affecting the Diesel engine, which have taken place during the past few years; the construction, operation, and maintenance, especially as to their marine applications, have been clearly presented.

Examination requirements and specimen examinations for 3rd, 2nd, and 1st assistant, and for chief engineer have been made the subject of a very helpful chapter.

(Continued on page 33A)

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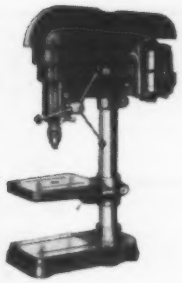

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(Continued from page 30A)

Woodworking Workbook

By Talmage Nichols and Harold L. Stiles. Paper, 61 pages, 7½ by 10½ in., illustrated. Price, 68 cents. The Manual Arts Press, Peoria, Ill.

This is a book on elementary woodworking procedures. It is divided into six parts.

The other chapters cover the different types of wood, tools and tool processes, wood fasteners, and finishing.

The last chapter lists a goodly number of projects from which the student can choose. A number of helpful forms for figuring costs also are shown.

Running A Milling Machine

By Fred H. Colvin. Cloth, 157 pages, 5 by 7½ in., illustrated. Price, $1.50. McGraw-Hill Book Co., New York City.

A book for the beginner on the milling machine and on the different kinds of work that can be done on this versatile power tool. The book is well illustrated and the subject matter is written in such a manner that it can be readily understood.

Woodworking for Fun

By Armand J. LaBerge. Cloth, 104 pages, 7¾ by 10 in., illustrated. Price, $2.25. Published by The Manual Arts Press, Peoria, Ill.

This book describes 16 projects that will appeal to almost any boy, especially if he belongs to the Boy Scouts.

Building Insulation

By Paul Dunham Close. Cloth, 328 pages, 5¾ by 8½ in., illustrated. Price, $3. American Technical Society, Chicago, Ill.

The author of this book is the technical secretary of the Insulation Board Institute. In this reference volume he covers both the principles of insulation and the methods of applying the various types of insulation materials now in use.

The fundamentals of heat transfer, transmission coefficients, and the calculation of heat losses are all treated in a thoroughly understandable manner.

Heat Treating and Inspection of Metals

Prepared under direction of the Chief of the Air Corps. Paper, 57 pages, 5⅞ by 9 in., illustrated. Price, 10 cents. Put out by the War Department, Washington, D. C.

This manual describes the principles of heat-treating; the equipment used for this type of work; the hardening, tempering, annealing and normalizing, and case hardening of steel and iron; the specific heat treatments used on aircraft steels and alloys, heat treatments of aluminum alloys, hardness testing, and magnaflux inspection.

Blueprint Reading

By Arthur A. Dick. Cloth, 157 pages, illustrated. Price, $2.40. Published by The Ronald Press, New York City.

This book has been written for the student in high school, vocational school, adult evening school, and teacher-training institutions.

It is especially applicable to the student who intends to follow the metal trades.

The Mathematics of the Shops

By Frank J. McMackin and John H. Shaver. Cloth, 444 pp., 5½ by 8⅝ in., illustrated. Price, $2.50. Published by D. Van Nostrand Co., Inc., New York, N. Y.

A book containing shop problems for those taking up the building trades, electricity, and machine-shop practice.

It contains a review of the fundamental operations of arithmetic, formulas and simple algebra, the slide rule, and simple trigonometry.

There are many problems, all of them applied to the fields already mentioned. A number of helpful tables are presented in the appendix.

Audels Machinists' and Toolmakers' Handy Book

By Frank D. Graham. Illustrated, 1600 pages, 5 by 6½ in. Price, $4. Published by Theo. Audel & Co., 49 W. 23rd St., New York City.

An entirely new book on machine-shop practice, it covers all of the various machines, such as the lathe, automatic screw machine, drill press, milling machine, boring mill, shaper, planer, slatter, and the like.

There also are chapters on blueprint reading, drafting, mathematics, shop physics, and the slide rule.

General Plastics

By Raymond Cherry. Paper, 7¾ by 10 in., 128 pages, illustrated. Price, $1.20. Published by McKnight & McKnight, Bloomington, Ill.

This book on plastics is divided into three sections devoted to related information, fundamental operations, and projects.

Section I gives a brief history of this interesting, new, industrial material, tells how the material may be used, what tools and additional supplies are needed, and lists the sources where the material may be obtained.

Section II describes how to perform the various operations met with in utilizing plastics, and Section III outlines the step-by-step procedures for making 42 interesting projects.

Miscellaneous publications which possess interest for the shop instructor:

High School Course in Self-Appraisal and Careers — Teacher's Manual

By Grace E. Munson and Lester J. Schloerb. Published by the Bureau of Child Study, Board of Education, Chicago, Ill.

Handbook of Careers

Edited by Herbert Burstein, A.B., LL.B., and written by 14 authorities in 14 fields. Price: cloth, $1; paper, 50 cents. Put out by the Thesis Publishing Co., New York, N. Y.

Shipbuilding Terms

By Fred C. Williamson. Price, 50 cents. Published by American Technical Society, Chicago, Ill.

(Continued on page 42A under Publications)

Shop Equipment News

New Products — Publications

BURGESS VIBRO-TOOL

The Burgess Handicraft Supplies Division of the Burgess Battery Co., Chicago, Ill., have recently produced a versatile little tool which works on the vibratory principle and which can be applied to many uses in industry and in the school and the home shop.

This Vibro-Tool vibrates at 120 vertical strokes per second. It is not a rotary type tool. It can be used for engraving on glass and metals, tooling leather, embossing and forming metal, carving wood and plastics, cutting linoleum blocks, making cutouts and the like.

The Vibro-Tool is a 60-cycle instrument, operating from a 110-volt a.c. outlet, and uses about as much power as that consumed by a 15-watt lamp.

A number of different attachments are available for this versatile little tool. The main operating parts are encased in a molded plastic case. It is easy to handle and runs all day without overheating.

THE NEW VAPOPAPER FOR AMMONIA DRY-DEVELOPED PRINTS

The Frederick Post Co., Chicago, has recently improved their ammonia dry-developed printing paper — Vapopaper. The new Vapopaper develops a deeper, sharper blue or red line print on a clean white background.

A very important feature of the new Vapopaper is that every roll, whether from the same shipment or a different shipment, is entirely uniform both as to speed and color. Printing and developing machines do not have to be set to conform with the variance of speed in different rolls of paper.

The new Vapopaper is not only faster but also is tougher. Its 50 per cent rag content basic paper stock enables it to bear considerable creasing and hard usage.

A free 5-yard sample is offered those who are equipped to produce ammonia dry-developed prints. In writing The Frederick Post Co., Box 803, Chicago, Ill., for your sample, state whether you prefer blue or red line Vapopaper in the regular or fast printing speed. Also state whether or not you are equipped to produce ammonia dry-developed prints.

SHATTERPROOFING SCHOOL WINDOWS IN BOMBING RAIDS

Recent tests in the United States, supplementing experiments carried on in England last year, have established satisfactory methods of treating window glass to prevent dangerous shattering and splintering during bombing raids.

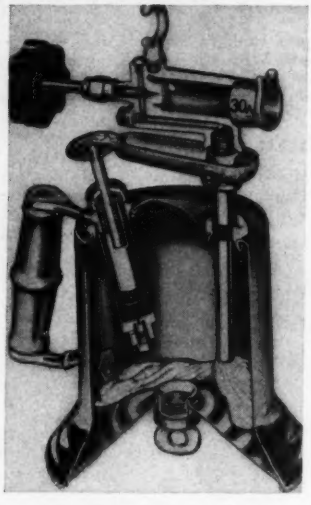
It was found that a backing of cheesecloth applied on the inside of windows with Arabol shatterproof paste, will protect them against dangerous splintering during air raids.

The paste itself is translucent, allowing a pleasant, diffused daylight to come through, and avoiding the unpleasant effect of blacked-out rooms during the day. The raw materials are not subject to priority and are readily available.

Further information may be obtained by writing to the Arabol Mfg. Co., New York City.

IMPROVED BLOWTORCHES

The Turner Brass Works, Sycamore, Ill., has just issued a four-page descriptive bulletin in which all of the "Turner Standard Line Torches" are illustrated and described. The outstanding improvements incorporated in the Turner blowtorches are: (1) oversized fuel passages for quick generating and nonclogging operation; (2) heavy jam-proof shoulder on the needle to prevent enlargement of the orifice; (3) all inlets are



Improved blowtorch

securely locked inside the tank to give 100 per cent blow-proof construction. In no case is solder depended upon to hold in a Turner inlet; and (4) easy action pump with self-lubricating pump leather. Since the pump does not lock down, the plunger rises automatically to give warning if a bit of sediment causes a check valve to leak.

HOW TO RUN A LATHE

To increase the effectiveness of the lathe operators' handbook for defense training purposes, the South Bend Lathe Works has just issued the 41st edition of their popular book, "How to Run a Lathe." A number of changes in text material and illustrations have been made since the previous edition was printed in 1941.

This book contains the latest information on the operation and care of metalworking lathes. It covers such subjects as the operation of the lathe units, grinding cutter bits, making accurate measurements, plain turning, chuck work, taper turning, boring, drilling, reaming, tapping, cutting screw threads, reference tables, and the like. It is written clearly and concisely, and is widely used as a shop text in schools and apprentice training courses. This edition consists of 128 pages and contains over 365 illustrations. Copies are available for 25 cents postpaid. Write to South Bend Lathe Works, Department K7, South Bend, Ind.

STEEL SPECIFICATIONS AND HEAT-TREATING CHART

The Chicago Flexible Shaft Co., Chicago, Ill., has prepared a "Stewarts S.A.E. Steel Specifications and Heat-Treating Chart" for distribution to school shops.

This chart gives the S.A.E. specifications for carbon steels, free cutting steels, manganese steels, nickel steels, nickel-chromium steel, molybdenum steels, chromium steels, chromium-vanadium steels, silicon-manganese steels, chromium-nickel-austenitic steels, and stainless-chromium irons.

The chart also contains a table of approximate comparable readings between the Brinell and Rockwell scleroscope tests. There also is a conversion and heat-range thermometer, and tables of typical heat treatments for steels of the carburizing heat-treating grades, and for common tool and die steels.

The firm will send these charts free of charge to schools requesting a copy.

PREFABRICATED PLYWOOD HOG AND POULTRY HOUSE

Prefabrication has entered the field of small plywood farm buildings, and prefitted sections can now be obtained which will go together on the farm with record speed to provide needed hog cots, brooder houses, and similar farm buildings.

This presents the easiest, fastest way to bolster productive capacities of farms right when our government demands abrupt increases in certain crops in order to win the war.

The plans, four for each of the different-use buildings, are adopted from specifications prepared at Michigan State College, Purdue University, Kansas State College, and University of Wisconsin. They are printed in the form of separate construction bulletins for hog structures and poultry houses, and are distributed free by Douglas Fir Plywood Association.

The plans are for these eight structures: an arch-roof hog cot with a floor 8 ft. square; a slant-roof hog house 6 by 8 ft.; a peak-roof individual hog house 6 by 7½ ft.; and a slant-roof hog sleeping shed 10 by 12 ft.; a combined brooder house and range shelter with screened ends and 12 ft. square; a shed-roof brooder house 10 by 14 ft.; a peak-roof brooder house 10 by 12 ft.; and a laying house 20 ft. square.

NEW CATALOG

K-D Manufacturing Co., Lancaster, Pa., has just issued Catalog No. 21, in which are listed the large number of varied auto-mechanic tools which this firm manufactures.

Among the tools listed are various types of valve-spring compressors and lifters, valve-keeper inserters, wrench sets, pliers, valve-guide puller sets, valve-assembly replacing tools, valve grinders and bushings, piston-pin tools, wheel pullers, ignition-point aligning and refacing tools, piston ringers and filers, riveting sets and dies, and the like.

NEW EDITION OF TECHNIQUES

♦ The Higgins Ink Co., Inc., 271 9th St., Brooklyn, N. Y., have just issued the fourth edition of their instructive book, already known to thousands of artists and draftsmen by its title, "Techniques."

The present edition has been enlarged to 38 pages of instructional material. It is divided into four sections which appear under the titles: Instructional, Techniques for Reproduction, Examples of Scholastic Work, and Examples of Professional Work.

The company's policy is to send one copy free of charge to each instructor requesting it on school stationery.

PRECISION METAL-CUTTING EFFICIENCY

E. C. Atkins and Co., 402 South Illinois St., Indianapolis, Ind., has just issued two bulletins, the one entitled "Guide to Metal-Cutting Efficiency," and the other "Precision With Speed."

The first of these explains the advantages of the new Atkins curled-chip system which has just been developed; and its application to the circular milling saw, segmental cold saw, and the silver-steel power-saw blade.

The booklet also describes their various other lines of saws and the provisions that have been made to make saw-sharpening service available to users of the Atkins Curled-Chip system of metal cutting.

The bulletin entitled "Precision With Speed" describes the perforating wave, cutting, and creasing rules which this firm fabricates. This booklet will be of special interest to printers, box makers, and manufacturers of display items.

INFORMATIONAL BULLETIN

The Jessop Steel Co., Washington, Pa., has just issued an eight-page, 5 by 7½-in. booklet explaining about their standard, special, and vanadium types of carbon tool steels.

Full directions for forging, annealing, hardening, and tempering are given. Several diagrams,

(Continued on page 37A)

(Continued from page 34A)

such as critical range diagrams on heating and on cooling also have been included.

A table of applications, listing the many different kinds of tools for which Jessop Tool steels may be used, is given.

WESTERN PINE CAMERA VIEWS

The Western Pine Association, 510 Yeon Bldg., Portland, Ore., is distributing a 16-page album with lithographed covers in four colors, filled with pictures of actual uses of the three western pines — Idaho white pine, Ponderosa pine, and sugar pine. It is strictly an *idea* book with a special appeal to those who want suggestions for new construction, remodeling, or interior decorating.

Every page is full of practical ideas for a modern home of moderate cost. Single copies will be sent without charge to anyone requesting the booklet.

News Notes

♦ With our economy on a full wartime basis, the necessity of training programs for civilian personnel is emphasized. Accordingly, the Federal Civil Service Commission has announced an examination to secure training specialists for government agencies. No written test is to be given; applicants will be rated on their education and experience.

Training specialists will be appointed to positions paying from $2,600 to $5,600 a year in various government departments. Their duties will be to plan and direct training programs for a variety of technical and professional personnel. They must adapt and devise training methods and materials. Acting as consultant to operating departments in matters of training policy and procedures will also be part of the work.

Applicants may qualify in three fields: general (diversified techniques); general (motion-picture technique); and trade and industrial. They must have had certain experience organizing, developing, and administering programs for training paid employees, or persons for paid employment, in industry, business, or government. Completion of either a 4-year college course or 4 years of additional experience is also required. Provision is made for using appropriate general administrative experience and graduate study in personnel administration for part of the prescribed experience.

Because a heavy demand for training specialists is anticipated, applications will be accepted until further notice at the Civil Service Commission, Washington, D. C. Copies of the examination announcement and application forms may be obtained at first- and second-class post offices or from the Commission's central office in Washington.

♦ Maps are implements of war! Topographic maps are needed for military operations, nautical charts for our navy and merchant marine, aeronautical charts for military aviation and for pilot training. Map- and chart-making agencies of the government are seeking skilled lithographers to produce the maps needed by our army, navy, and merchant marine.

The Civil Service Commission just announced an examination to secure lithographers (artistic or mechanical) for positions paying from $1,440 to $2,000 a year. Because of the demand for qualified eligibles, applications will be accepted by the Commission until further notice. A written test will not be given; applicants will be rated on their education and experience. If you are qualified and available, apply today!

For all grades, applicants must have had nine months skilled, paid experience in a lithographic shop, in one or more operations used in lithographic reproduction work. In addition to this experience, for all but the junior grade positions, additional experience is required in one specialized phase of lithographic reproduction work, such as negative engraving, platemaking, work on plates or stones, presswork, or other operations.

For the nine months' skilled experience required, applicants may substitute: (*a*) six months' course at a lithographic school; (*b*) one year college study which included six semester hours in lithography; (*c*) one year appropriate night school or technical institute study; or (*d*) a United States approved defense training course in lithography. Applications will be accepted from persons who are now taking the college or technical institute study.

Examination announcements and application forms may be obtained at first- and second-class post offices or from the Civil Service Commission, Washington, D. C.

♦ An emergency cooperating committee for children and youth has been established through the efforts of Marshall Field, chairman of the National Citizens Committee of the White House Conference on Children in a Democracy, and George F. Zook, president of the American Council on Education, it was announced yesterday by representatives of the two organizations.

Growing evidence that problems of children and youth will become increasingly severe during wartime was given as the compelling fact underlying the establishment of the joint committee. Belief was expressed by committee members that the health and vital interests of children and youth will be threatened during the war years unless adequate protective measures are taken, and that such measures are essential to defense and the nation's security.

The new committee will be composed of members of the White House Conference group, known as the National Citizens Committee, and of the American Youth Commission of the American Council on Education. Floyd W. Reeves, director of the American Youth Commission, will be chairman of the cooperating committee; Homer Folks of the National Citizens Committee, vice-chairman.

Further cooperative activities, it was an-

(Continued on the following page)

End
CLASSROOM
"Bottle-Necks"
WITH THIS MODERN
VOCATIONAL TRAINING
EQUIPMENT
Drawing Table
Steel Stools
Wood-Working Bench
Sheet Metal Work Bench
Arc Welding Bench
LYON SHOP EQUIPMENT
You can handle larger classes... more efficiently ... without taking over space needed for other purposes ... by modernizing present vocational training classrooms with practical, space-saving Lyon Steel Equipment. Designed by engineers who know the practical requirements of both factory and school, Lyon Drawing Tables, Welding Benches, Woodworking Benches, Metal Working Benches, etc., provide work areas and storage facilities to accommodate a maximum number of students in a minimum of floor area. Mail coupon for catalog.
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General Offices: 2611 Madison Ave., Aurora, Ill.
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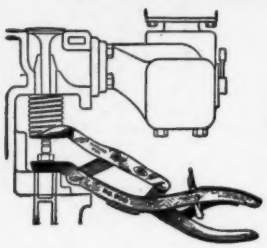
LYON METAL PRODUCTS, INCORPORATED
2611 Madison Avenue, Aurora, Illinois
Send FREE copy of new Lyon Catalog.
Name
Address
City State

THE RIGHT K-D TOOL
Does the job Easier, Faster!

THIS IS THE LIFTER BUILT TO WORK UNDER FENDERS

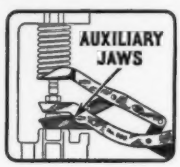


• The K-D 900 "Hi-Offset" Lifter was designed for underfender operation particularly, but is suited to most modern motors having low-hung manifolds. The cut is actual scale on a late model Plymouth. Note clear view of valve and ample working clearance.

• The tempered jaws are adjustable. Overall length of 900 is 8¾". Total parallel lift of 3". Tempered safety ratchet lock.

• An exclusive and very important feature of the 900 Lifter is its Auxiliary Jaws, necessary on some motors with unusual tappet-to-spring clearance, notably Chrysler C-7, DeSoto S-1 and Dodge truck.

• These jaws are hinged to the body of the Lifter and are swung back out of the way when not in use.



★ ★ ★ ★ ★

The 605 INSERTS Nearly All SPLIT KEEPERS

• A strong, light Keeper Inserter, the favorite in thousands of shops. It will handle all but the very extreme sizes . . . about 90%. Thumb pads provide an easy way to load the 605 as shown in the cut.

• 605 is self-supporting on the valve stem. Its strong gripping springs hold the keepers snug to the stem until the tool is pushed away by the valve spring washer as the spring is lowered.

★ ★ ★ *Write for K-D's Catalog No. 21, just off the press. It shows these and over 60 more K-D Tools.* ★ ★ ★

K-D TOOLS
Sold by Automotive Jobbers everywhere
FACTORY, LANCASTER, PA.

(Continued from previous page)

nounced, will be considered at an early meeting of the emergency cooperating committee for children and youth.

♦ The Western Pine Association announces the release of a new 6-page folder entitled "Distinctive Paneling of Clear Pine." During the past year there has been a very definite trend to a greater use of the clear grades of western pines, not only in home decoration but in shops, hotels, schools, and other public places.

The new paneling folder contains 12 excellent examples of natural, stained, and enameled installation of clear western pines. It is a two-color folder, 3¼ by 6⅛ in. in size.

Single copies of this folder will be sent free to any person interested, by the Western Pine Association, 510 Yeon Bldg., Portland, Ore. Quantity lots are also available at nominal cost.

♦ The National Association of Retail Grocers are sponsoring a training course for grocers. A small booklet entitled "National Grocers Institute Information Bulletin," describes the course. Classes using the material recommended are now operating in Wichita, Kansas City, Topeka, Augusta, Kingman, and Ellinwood. It is expected that several other classes will start soon.

♦ A new, 100 by 125-ft. school-shop building has just been completed at Clovis, N. Mex. It will house shops in which woodwork, carpentry, drafting, sheet-metal work, machine-shop practice, and welding is to be taught.

♦ The United Air Lines Transport Corp. is announcing their enlarged 1942 Mainliner Teacher's Kit.

The Kit contains the following items: (1) a 52-page Teacher's Manual of Aviation facts and pictures; (2) 24 printed pictures, 9 by 12 in., of historic and present-day planes and air travel; (3) an airline map of the United States, 20 by 24 in., and 40 small airline maps, 9 by 12 in., having on the opposite side of each a picture of a Mainliner plane with its parts pointed out and named; (4) 40 sheets of air mail, air express, and air baggage stickers, together with colorful poster material. The 40 sheets with airline maps on one side and Mainliner plane with parts indicated on the other, and the 40 sheets of air mail, express, and baggage stickers are included especially for the individual students. (5) Appropriate suggestions are included for the use of all materials in the kit. A charge of 25 cents is made to pay part of the postage and of the cost of materials.

♦ To help meet the huge wartime demands for stretchers, splints, and other first-aid equipment, the American Junior Red Cross is harnessing the productive powers of its 13,000,000 members in a nation-wide production program, it was announced today.

In Junior Red Cross units in schools from coast to coast, young Americans will turn their manual-training talents to the making of Red Cross emergency stretchers and Red Cross emergency traction splints. In addition such first-aid articles as may be requested by officials of the Emergency Medical Service will be produced by these juniors.

The production program already has been established by Red Cross chapters on the Pacific coast. In the Gallileo High School in San Francisco, for example, 90 boys produced 400 stretchers within a week.

In schools where there is a Junior Red Cross enrollment, manual-training rooms will afford equipment for making the articles. Materials necessary will be purchased by the local Red Cross chapter. The program will be financed by the Red Cross War Fund now being raised, or with local Junior Red Cross service funds.

Adults who have workbenches in their homes as a hobby can offer their services to the local Red Cross chapters. They were urged to do so before starting to build the articles in order to learn the needs of the community.

♦ A greatly increased production of vital welded war products is forecast by a new procedure in fillet welding just announced by The Lincoln Electric Co., leading manufacturer of arc-welding equipment.

The new "Fleet-Fillet" technique developed by extensive study and experiment, is now being introduced in several large shipyards. Full technical details will be made available to industry generally as rapidly as possible.

♦ A "ground" course in aeronautics has been added to the curriculum of several Indiana high schools for this semester. Authorization of the course was made by the state board of education. Dr. Clement T. Malan, superintendent of public instruction, said the course covers the theory of flight, aerodynamics, meterology, aerial navigation, and a general survey of aids and safeguards.

♦ The Visual Air Program, WPA, at Harrisburg, Pa., is preparing visual aids for high school war-aviation courses, which may be found helpful in many places.

The visual aids constructed so far consist of an airplane made to one fifth actual size, a three quarter actual size model radial gasoline-type aircraft engine, a model airplane for giving instruction in the handling of controls and the teaching of flight maneuvers, and a double size demonstration model sextant.

Each of these models involve some costs to the contributing sponsor ordering them.

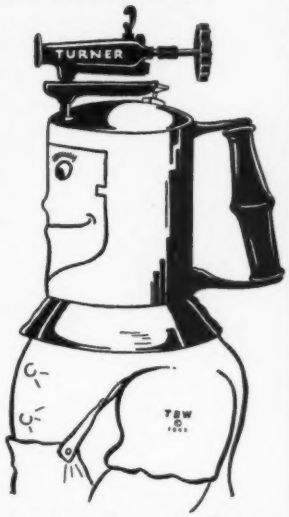
Address all inquiries to Visual Aid Program, WPA, 46 North Cameron St., Harrisburg, Pa., Attention: L. B. Sisson.

♦ Six one-reel, all-color sound motion pictures designed to help speed war efforts through the faster and better training of welding operators are now under way for the General Electric Co. The title of these films is "The Inside of Arc Welding."

When completed the pictures will be made available to public, private, and industrial welding schools, as well as to other interested groups. The first of the pictures covers the fundamentals of arc welding. It is scheduled for general release about April 20.

(Continued on page 40A)

A NEW RECRUIT
MEET "TORCHY TURNER"!



A new member of the Turner Family has enlisted in the Victory Program.

"Torchy Turner" will appear in future issues of Turner Topics, in which he will bring you suggestions and information on:

- **How to get the most efficient service from your blow torch.**
- **How to make your blow torch last longer.**
- **Handy uses for your blow torch.**

Send your blow torch problems to "Torchy Turner." Write at once and ask to be put on the mailing list to receive the future issues of Turner Topics. Be sure to state the number of copies you wish if they are to be distributed to your classes or mechanics.

Write now to: **THE TURNER BRASS WORKS**
Department VE SYCAMORE, ILLINOIS
"OUR 71st YEAR"

Facts Worth Teaching—

Here's HOW to SAVE
- **Up to 2½ Production Hours**
- **Up to 50% on Gas Bills**
- **Valuable Floor Space**

JOHNSON FURNACES for INDUSTRY
FOR MORE THAN 40 YEARS

No. 130 Hi-Speed Steel Heat-Treating Furnace Gives 2300° F. in 22 Minutes

Produces the quick, accurate hi-temperature needed today. Equipped with G.E. motor and extra large Johnson Blower. Firebox: 13"x13½"x-5", heavily lined with insulating refractory. $248 F.O.B. Factory. Available in other sizes, and also built to your specifications.

Sales Offices:
Bourse Building, Philadelphia
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C. B. Babcock Co.
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It's Free!

Johnson Gas Appliance Co.
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Please send me Free Johnson Catalog.
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Address .....
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Free to SCHOOLS and INSTRUCTORS

an authoritative COURSE in SURFACE RACEWAY WIRING

In response to many requests, The Wiremold Company has prepared a practical and complete instruction course for electrical wiring with Surface Metal Raceways and Fittings.

Designed specifically for use in electrical shop courses, this material is conveniently divided into two parts: (1) Instructor's Key Sheets which give the correct fitting numbers for all required materials, and (2) Student's Assignment Sheets which include descriptions and diagrams of the assigned jobs. The Assignment Sheets are printed on special thin paper so that they may be handed out to students for blueprint reproduction if desired.

FOLLOWS APPROVED SCHOOL PRACTICES

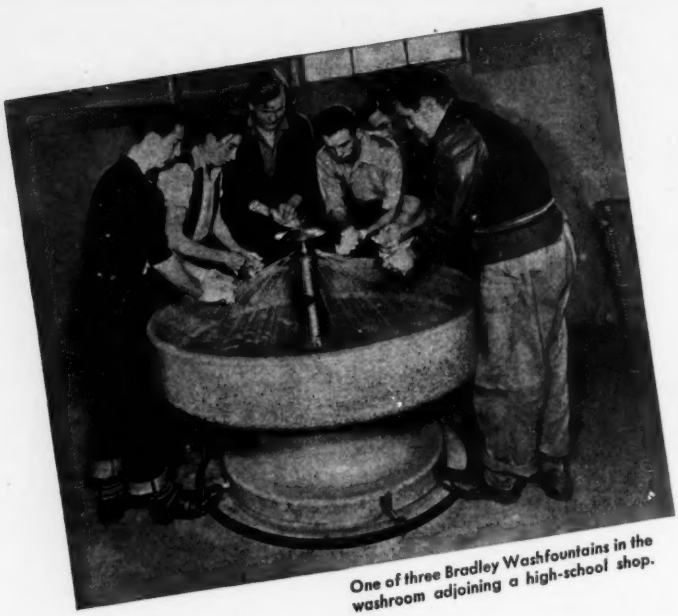
In preparing this material, The Wiremold Company worked in collaboration with Mr. John J. L. Gross, Instructor in Applied Electricity at the Murrell-Dobbins School in Philadelphia. The course is in full accordance with approved school practices in teaching this subject.

WRITE FOR A FREE COPY OF THE COURSE

Free copies of the course are available, to schools and electrical instructors. Since the material represents a considerable investment in both time and money, we wish to limit the distribution to those vitally interested in it; therefore, we request that your letter be written on your school letterhead, or that it be accompanied by other suitable identification. A nominal price of $2.50 per copy has been set for general distribution.

This material is offered by The Wiremold Company as a free service to vocational and trade schools. We are sure you will find that it is interesting and authoritative, and that it will lend itself to practical application in electrical shop courses.

THE WIREMOLD COMPANY
HARTFORD, CONN.



One of three Bradley Washfountains in the washroom adjoining a high-school shop.

Shop Students Need These Sanitary Group Fixtures

Clean, sanitary washing fixtures are a necessary part of every school, and modern Bradley Washfountains have replaced the conventional single-person wash basins because they provide the ultimate in sanitation,—save space, require 90 per cent fewer piping connections, and cut water consumption 70 per cent. They serve 8 to 10 simultaneously, with clean running water from a central sprayhead.

Bradleys conserve critical war material—the big bowl and pedestal are of precast stone or marble and as mentioned above they reduce piping connections because one Washfountain replaces 8 to 10 single-person wash basins.

Bradley Washroom Consultants will gladly make washroom layout recommendations. BRADLEY WASHFOUNTAIN CO., 2269 West Michigan Street, Milwaukee, Wisconsin.

Catalog 4010 will be mailed on request.

BRADLEY washfountains

(Continued from page 38A)

The other pictures will be available about June 1, and will deal with technique of arc control and electrode manipulation for all welding positions, using both direct- and alternating-current equipment.

Information as to how to obtain the pictures will be supplied by the Visual Instruction Section, Publicity Department, General Electric Co., Schenectady, N. Y.

♦ With American school youth well started toward the goal of making 500,000 scale models of United Nations and Axis warplanes, the United States Office of Education, in conjunction with the Navy Bureau of Aeronautics, has released names and designations of the second set of 20 types of planes to be modeled.

Public and private school students are making 10,000 models of each of 50 types of aircraft for use in range estimation, gunnery, and identification training for personnel of the navy, army, and civilian defense forces.

Thousands of model aircraft project directors, representing school districts in every section of the country, received plans and specifications for the first set of 20 types on February 23, and the 200,000 completed models in this set are expected to be delivered soon at the various receiving centers.

Plans for the second set of 20 planes named today were mailed to local project directors about March 20, and the last 10 types about the middle of April, the United States Office of Education announced.

♦ The Thomas Jones High School, West Allis, Wis., has been renamed Central High School.

♦ Of interest to teachers of printing may be the No. FS2.7-a2304 bulletin on lead poisoning. It may be obtained from the Superintendent of Documents of the Government Printing Office, at 5 cents per copy.

♦ The Troy Board of Education gave the "go-ahead" signal at a meeting Tuesday evening for the new high school industrial-arts building following arrangements with the U. S. army air corps which will make it possible to secure priorities on needed material for the structure.

The architect, J. F. Pretzinger, has been directed to complete detailed plans as soon as possible.

♦ Teachers of auto mechanics who are interested in the conservation of gas, oil, and rubber may obtain GM's free movie entitled "It's Up To Us." The 16 or 35mm. sound film, showing time 10 minutes, is available through General Motors Public Relations Department, 1775 Broadway, New York, N. Y.

♦ Nonpriority materials and the use of odd and discarded articles will be featured in the Camp Craft Counselors' Course this Spring at the Universal School of Handicrafts in Rockefeller Center. Two groups, meeting 10 Thursday evenings and 10 Saturday afternoons, will concentrate on new ideas, projects, and materials.

Full information may be had by writing the Universal School of Handicrafts, 25th Floor Studios, R.K.O. Building, Rockefeller Center, New York City.

♦ The 1942 edition of the Filmosound library's catalog of recreational films, containing over 1300 subjects, has just been released. More than 100 new titles have been added — all carefully selected to meet the requirements of the school, the church, and the home.

One of the new aids incorporated in the recreational catalog is the complete index and sale-price list. Films available through the newly established Filmosound 8mm. Rental Library are also listed.

Copies of the recreational catalog are supplied free of charge to all projector owners who use or plan to use recreational films. Requests should be sent to the Bell & Howell Co., 1801 Larchmont Ave., Chicago, Ill., and should state the model and make of the equipment owned.

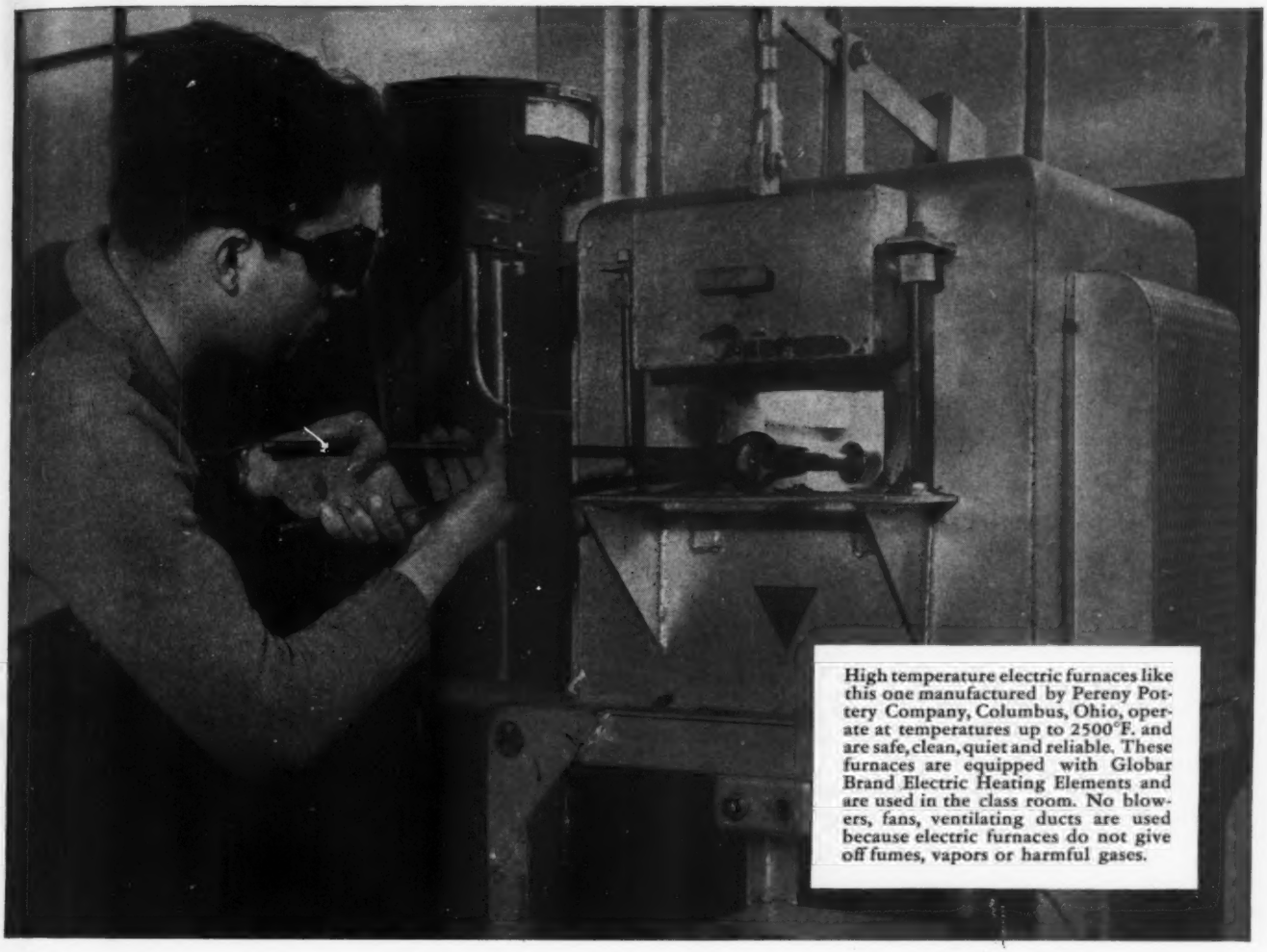
♦ The United States Testing Co. announces plans for offering its yearly summer course in current textile analysis and testing at Columbia University. Studies will include current textile theories and testing procedures, fiber, fabric, and clothing analysis, manufacture, and testing; the identification, origin, and nature of the natural fibers, older and newer synthetics, such as the rayons, casein, vinyon, nylon, fiberglas; the testing of woven and knit fabrics for such factors as construction, thread count, fiber identification, tensile strength, seam slippage, color fastness to light. A study of the new testing equipment recently developed, such as the warmth tester, snag tester, torture machine on mattresses, and various shrinkage devices, will also be made.

This year's class will be held during the company's regular business hours from 9 a.m. to 4 p.m., from July 6, through July 24, excluding Saturdays and Sundays. There will be a small fee charged to cover the cost of supplies, duplicated text and samples necessary for the students' laboratory work. The group of students will be limited in number, in order that they may have the advantage of individual instruction and the opportunity to work with actual testing equipment. Applicants are required to have some elementary and textile training in order that some major portion of the three weeks may be devoted to an intensified study and use of testing apparatus.

Representatives of the fields of education, home economics, industry, and retailing are invited to take the course, applications for which may be obtained from the United States Testing Co.'s main laboratories in Hoboken, N. J.

♦ Because the greatest responsibility for all qualified industrial teachers is now to do even a better job than heretofore, teachers not fully qualified for the highest type of service should avail themselves of summer study in a school qualified to remove the deficiencies and to increase the effectiveness of their teaching program.

(Continued on page 42A)



High temperature electric furnaces like this one manufactured by Pereny Pottery Company, Columbus, Ohio, operate at temperatures up to 2500°F. and are safe, clean, quiet and reliable. These furnaces are equipped with Globar Brand Electric Heating Elements and are used in the class room. No blowers, fans, ventilating ducts are used because electric furnaces do not give off fumes, vapors or harmful gases.

Picture of a young man looking into the future . . .

AS a matter of fact the young man is looking into the future that you are helping him to plan. He is preparing for a job, which may very well be a war job, that he will take on when he leaves your class.

Whether he will take up forging, heat treating or ceramic firing, he will find that the clean, uniform, easily-controlled heat of a Globar-equipped furnace will help him turn out better products faster and with fewer rejects.

If you want to give your students the best "break" for their futures. If you want to accustom them to things as they are done in up-and-coming plants. . . teach them their trades at furnaces equipped with Globar Brand Electric Heating Elements. They'll learn how to do their jobs better, for themselves, and what is even more important in times like these, for their country!

Write for information. We will be glad to refer your inquiry to an equipment builder specializing in the type of equipment best suited to your purpose. Be sure to outline your problem in as much detail as you can and everything possible will be done to assist you in your splendid work.

Globar Division

THE CARBORUNDUM COMPANY

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First Session — June 20 to July 25;
Second Session — July 25 to August 29.

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GRADUATE AND UNDERGRADUATE work in Industrial Arts and Vocational Education, with a splendid physical plant, a resident staff of competently trained men, and guest professors of national prominence.

The student may plan a program which will lead through successive summers to the bachelor's or master's degree. Approved programs carrying the recommendation of Oregon State College are accepted by all state departments of education for either a *Special* or a *General Secondary* Credential. See the half-page advertisement in the March issue of Industrial Arts and Vocational Education for a full list of courses available in the Industrial Education Program. Correspondence invited.

Address: Department of Industrial Education, Oregon State College
Corvallis, Oregon

Authorized by State Board of Higher Education.

THE PENNSYLVANIA STATE COLLEGE

Summer Program 1942

Trade and Industrial and Industrial Arts Education Doctors', Masters', and Baccalaureate Degrees

Three summer sessions for in-service teachers, administrators, and other qualified individuals. Courses designed to meet current national problems. Limited number of short unit courses.

The Summer Sessions:
June 8 to June 26; June 29 to August 7; August 10 to August 28.

Upperclass Term:
For sophomores, juniors, and seniors — May 18 to August 28.

Freshman Term:
For entering students — June 8 to August 28.

For further information and catalogues address:

Director of Summer Sessions
Room 104 Burrowes Building

The Pennsylvania State College
State College, Pennsylvania

(Continued from page 40A)

Such courses for professional improvement are offered in the summer sessions at Oregon State College, Corvallis, Ore., the first session running from June 20 to July 25, and the second session from July 25 to August 29.

Teachers interested in Industrial Education — whether in the industrial-arts phases or the trade-vocational phases — will find that the program offered will meet the approval of any state department of education for either a special credential or a general secondary credential. A wide variety of courses on either the graduate or undergraduate level is offered, so that teachers of industrial arts or vocational-industrial subjects, can pursue studies that will meet their own particular needs and also apply toward certification requirements. Finally, for those interested in obtaining a degree, a cumulative program is possible that leads through successive summers to either the bachelor's or the master's degree.

For information on summer-session work, address V. V. Caldwell, Director of Summer Sessions, 814 Oregon Bldg., Portland, Ore.

♦ The thirty-seventh annual Stout Institute summer session opens June 22, 1942. Opportunities are available for work on the three-week, six-week, and nine-week bases. Graduate work will be available on either the three- or six-week basis; undergraduate work will be available on the three-, six-, or nine-week basis.

The range of work offered for the summer session and the combinations of courses which are possible are planned to serve in the variety of developing educational demands. Vocational teachers and administrators will find many specific courses in the summer session planned to be of immediate value for them. The Wisconsin State Board of Vocational and Adult Education is cooperating with The Stout Institute. The summer-session schedule carries a strong range of courses required for vocational certification. Units of work will be available for those who have responsibility in developing the civilian defense program.

High school graduates who use the nine-week summer session in combination with the regular sessions, will be able to complete four years of college work in three calendar years. Those who wish to complete three years of work to meet the minimum college requirements for technical teaching positions in the army service schools will find the necessary combinations of work available. High school graduates who wish to take the special college program under the Navy V-1 plan may take work meeting these requirements and at the same time counting directly as credit for the degree requirements.

Special three-week short units on the graduate and undergraduate basis will be offered. Various fields will be represented, including vocational supervision, administration and co-ordination; nutrition, income, and food selection; civilian defense leadership, personnel relationships in vocational education, and education for democracy. Refresher courses will be available this summer in nutrition and foods, and in the consumer-information field, with the idea that many home-economics teachers will want to bring themselves up to date in these particular lines of work to meet the above problems.

The acute shortage of industrial teachers of various classifications has brought increasing responsibilities for teachers now. Units of work in a variety of shop and drawing courses have been provided in the summer session to enable industrial teachers to prepare for these increased responsibilities. Various combinations are available during the first six weeks. Opportunities for intensive work are available during the last three weeks of the nine-week period.

Students who have attended regular sessions who wish to use the summer session to accelerate their progress toward the completion of degree requirements, and regular session students who wish to prepare for new professional objectives because of the war demands will have opportunity to do so.

Dormitory and cafeteria facilities will be available, and the summer camp colony will again be open. The camp colony for the past 10 years has been used by a number of summer-session students and their families.

Conference leaders and special speakers will be scheduled, with particular attention being given to the special responsibilities assigned to the schools in wartime.

Summer-session bulletins are vailable on request.

PUBLICATIONS

(Continued from page 33A)

This booklet is especially prepared for shipbuilding workers.

Supervision of Secondary Education As a Function of State Departments of Education

By Carl A. Jessen and W. T. Spanton. Paper covered, 44 pages. Published by the U. S. Office of Education, Washington, D. C.

The Nature and Use of Reading Tests

By Arthur E. Traxler. Paper, 64 pages. Price, 90 cents. Published by Science Research Associates, Chicago, Ill.

Studying Effectively

By C. Gilbert Wrenn and Robert P. Larsen. A manual of answers to two major questions which confront every student. Published by Stanford University Press, Stanford University, Calif.

Measuring the Intellectual and Cultural Backgrounds of Teaching Candidates

By David G. Ryans. Distributed by The American Council on Education, 15 Amsterdam Avenue, New York, N. Y.

Books That Train Students for Competence in War Industry

METALWORKING MADE EASY

By William J. Becker

Instructor, Industrial Arts, Boynton Junior High School, Ithaca, N. Y.

Only basic tools and economical materials are required to make the forty-some simple metalworking designs in this book. *$1.60*

ACCURATE HOME ESTIMATING

By Thomas A. Roberts

Instructor, Masonry Trades and Building Construction, Milwaukee Vocational School, and Ruth A. Roberts, Designer, Milwaukee, Wis.

This book gives the student of carpentry, the building trades, and architectural drawing a quick approximate method of estimating the costs of home construction.

FURNITURE DESIGN PLATES

By A. F. Bick

Instructor, Public Schools, Milwaukee, Wis.

Over 200 full-size drawings of up-to-the-minute small woodturning projects and furniture designs, with a manual covering what the student should know of woodworking.

Part I—Plates 1-14 and Manual—*$3.00*

Part II—Plates 15-30 and Manual—*$3.00*

IT'S FUN TO BUILD MODERN FURNITURE

By Clifford K. Lush

Supervisor, Industrial Arts Education, Minneapolis Public Schools, Minneapolis, Minn.

Fifty-one shop-tested woodworking problems selected for their boy appeal and ease of construction with sufficient variety for a complete woodworking course in the shop with minimum equipment. *$1.75*

TRADE AND JOB ANALYSIS

By Dr. Verne C. Fryklund

Associate Professor, Industrial Education, University of Minnesota, Minneapolis, Minn.

With the aid of this plan, the teacher can analyze any occupation to enable him to instruct classes intelligently in all the different occupations or trades, even those occupations which cannot be classified as skilled but which need systematic training.

OPERATION OF COMMON WOODWORKING MACHINES

By Herman Hjorth

Instructor, Saunders Trade School, Yonkers, N. Y.

A basic text and reference for a comprehensive course in machine woodworking for beginners. Describes operations of and shows the correct methods of feeding various woodworking machines.

Berg's New Text

MECHANICAL DRAWING

Instruction Units and Problems, Books I and II

By Edward Berg

Group Chairman, Industrial Arts Dept., Washington High School, Milwaukee, Wis.

These new texts are based on recommendations resulting from a careful study by experienced teachers. They present a course featuring improved methods of presentation.

Book I gives the fundamental principles, stressing the ability to make and read working drawings by the beginning student. *64 cents*

Book II is the introduction to the study of the more important applications and special fields of mechanical drawing. *56 cents*

SHOP MATHEMATICS

By C. A. Felker

Professor of Vocational Education, University of Toledo, Toledo, Ohio

A specialized and advanced course in the practical application of mathematics for the student who wants to become a machinist or toolmaker. *$2.20*

APPLIED MATHEMATICS

By James F. Johnson

Late Principal, Essex County Boys' Vocational School, Newark, N. J.

This text teaches every boy planning to leave high school for industry the application of elementary math to everyday problems in industrial activities, manufacturing, and trade work. *$1.60*

AIR CONDITIONING METAL LAYOUT

By Joseph J. Kaberlein

Instructor, Washburne Trade School, Chicago, Ill.

The only complete working guide that shows the student modern, practical methods of laying out and cutting the patterns used in round, square, rectangular, and transition fittings used in heating, ventilating, and air conditioning. *$3.75*

MILLING-MACHINE INDEXING

By C. A. Felker and H. W. Paine,

Professor of Vocational Education, University of Cincinnati, Cincinnati, Ohio

A thorough treatment of the five accepted types of indexing for the upper grades, showing how the calculations are to be made. Mathematical formulas simplify the work of both teacher and student. *$1.50*

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